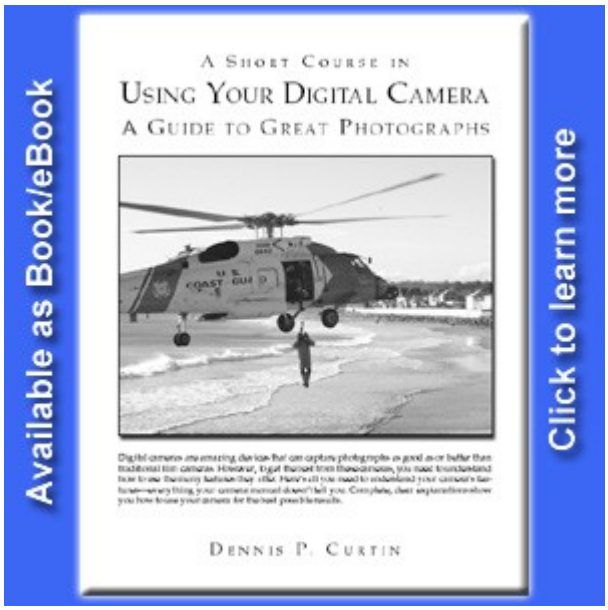
1. Camera Controls and Creativity



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Serious digital cameras give you creative control over your images. They do so by allowing you to control the light and motion in photographs as well as what's sharp and what isn't. Although most consumer digital cameras are fully automatic, some allow you to make minor adjustments that affect your images. The best ones offer a wide range of controls-in some cases more than you'd find on a 35mm SLR. However, regardless of what controls your camera has, the same basic principles are at work "under the hood." Your automatic exposure and focusing systems are having a profound affect on your images. Even with your camera on fully automatic, you can indirectly control, or at least take advantage of the effects these controls have on your images.

In this chapter, we'll first explore how you use the camera in various automatic modes and see what effect each of the settings has on your images. In the chapters that follow, we'll explore in greater depth how you take control of these settings, and others, to get the effects that you want.

Automatic All the Way

All digital cameras have an automatic mode that sets focus, exposure, and white-balance for you. All you have to do is frame the image and push the shutter-release button. You'll find that this auto mode of operation is great in the vast majority of situations because it lets you focus on the subject and not on the camera.

- **Getting Ready**. Turn the camera on and set it to automatic mode. To conserve your batteries, turn off the LCD monitor and compose

your image through the optical viewfinder. If the camera has a lens cap, be sure to remove it.

- **Framing the image**. The viewfinder shows you the scene you are going to capture. To zoom the lens to frame your image, press the zoom-out button or lever to widen the angle of view and the zoom-in button or lever to enlarge subjects. If the image in the viewfinder is fuzzy, see if the camera has a diopter adjustment dial you can use to adjust it.
- **Autofocus**. The area you place in the focus area in the center of the viewfinder is used to determine the sharpest part of the scene. How close you can focus depends on the camera you are using.
- **Autoexposure**. Programmed autoexposure measures light reflecting from the scene and uses these readings to set the best possible exposure.
- **Autoflash**. If the light is too dim, the autoexposure system will fire the camera's built-in flash to illuminate the scene. If the flash is going to fire, a flash lamp usually glows red when you press the shutter-release button halfway down.
- **Automatic white balance**. The color cast in a photograph is affected by the color of the light illuminating the scene so the camera automatically adjusts color balance to make white objects in the scene look white in the photo.

How To: Taking a Picture in Automatic Mode

1. Turn the camera on and set it to automatic mode. Be sure to remove the lens cap.

   - Look in your camera manual for a section on selecting automatic exposure
   - Look in your camera manual for a section on turning the LCD monitor on or off

2. Compose the image in the viewfinder making sure the subject that you want sharpest is in the focus area in the center of the viewfinder.

3. Press the shutter-release button halfway down so the camera can set focus, exposure, and white balance. When the camera has done so, a lamp may glow or the camera may beep.

4. Press the shutter-release button all the way down to take the picture. When you do so, the camera may beep. The camera then saves the new image onto the camera's flash card.

5. When done, turn the camera off.

Choosing Image Quality and Size

The size of an image file and the quality of the picture it contains depend in part on the number of pixels in the image and the amount of compression used to store it.

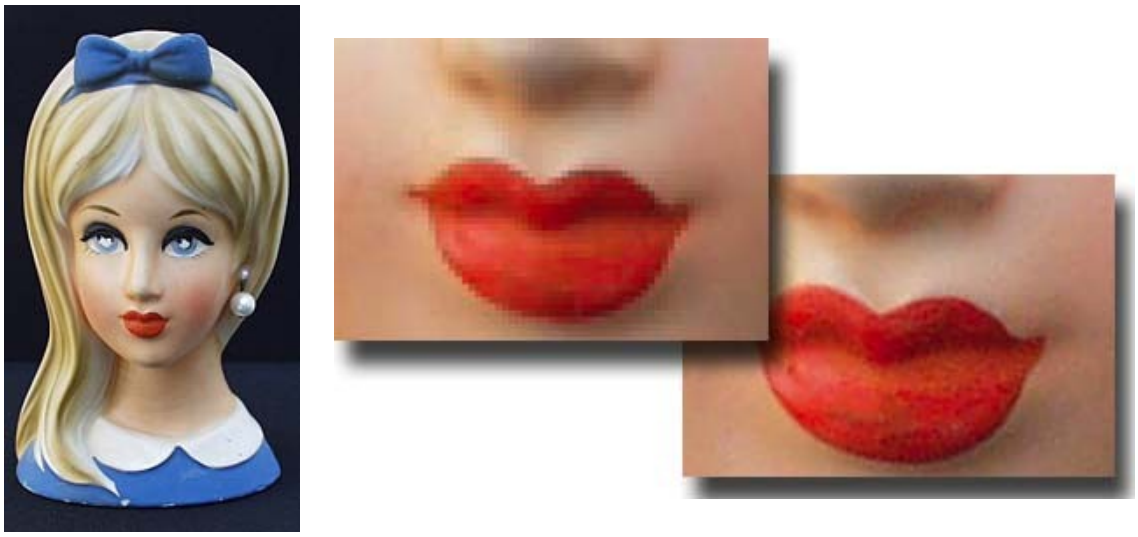
Compression

To make large image files smaller and more manageable, digital cameras store images in a format called JPEG after its developer, the Joint Photographic Experts Group and pronounced "jay-peg." This file format not only compresses images, it also allows you to specify how much they are compressed. This is a useful feature because there is a trade-off between compression and image quality. Less compression, sometimes called Fine mode, gives you better images so you can make larger prints, but you can't store as many images. More compression, in modes such as Normal or Basic, lets you store more images and makes the images better for making smaller prints, posting on a Web page, or sending as e-mail attachments. The only problem is that your prints won't be quite as good. For the highest resolution, some cameras offer an uncompressed format.

Here, two versions of the same image have been enlarged. The image on the left is uncompressed. The one on the right is a compressed JPEG file.

Image size

In addition to offering two compression modes, many cameras let you also change image size as a way of controlling the size of image files. Because you can squeeze more 640 x 480 (VGA) images into a storage device than you can squeeze 1600 x 1200 images, there may be times when you'll want to switch to a smaller size and sacrifice quality for quantity.



The left top image of lips is a detail blown up from the image (left) shot in a low res mode at a small size. The bottom right lips were shot at a high res mode at a larger size. These are the widest extremes you'll find with most digital cameras.

How To: Selecting a Quality Mode

Look in your camera manual for a section on **image quality**, **image size**, or **compression**.

The Shutter Controls Light and Motion

The shutter keeps light out of the camera except during an exposure, when it opens to let light strike the image sensor. The length of time the shutter is open affects both the exposure of the image and how motion is portrayed in it.

The shutter and exposure

Slower shutter speeds let more light strike the image sensor making an image lighter. Faster shutter speeds let less strike it and make the image darker.

In these pictures, the shutter was left open longer for the image on the left than for the one on the right. It's this longer exposure time that has made the image lighter.

The Way It Was: Early Shutter Designs

The shutter, used to control the amount of time that light exposes the

image sensor, has changed considerably over the years. The earliest cameras, using materials that might take minutes to be properly exposed, came with a lens cap that the photographer removed to begin the exposure and then replaced to end it. As film became more sensitive to light and exposure times became shorter, faster shutters were needed. One kind used a swinging plate while another design used a guillotine-like blade. As the blade moved past the lens opening, a hole in the blade allowed light to reach the film.

The shutter and motion

In addition to controlling exposure (the amount of light that reaches the image sensor), the shutter speed is the most important control you have over how motion is captured in a photograph. Understanding shutter speeds is vital if you want to anticipate if a moving subject will appear in your image sharp or blurred. The longer the shutter is open, the more a moving subject will be blurred in the picture Also, the longer it's open the more likely you are to cause blur by moving the camera slightly.

A fast shutter speed (left) opens and closes the shutter so quickly a moving subject doesn't move very far during the exposure, a slow speed (right) can allow moving objects to move sufficiently to blur their image on the image sensor.

Katie turned a little just as the shutter opened causing unwanted blur in the image.

Understanding shutter speed settings

Although digital cameras can select any fraction of a second for an exposure, there are a series of settings that have traditionally been used when you set it yourself (which you can't do on many digital cameras). These shutter speed settings are arranged in a sequence so that each setting lets in half as much light as the next slowest setting and twice as much as the next fastest. The traditional shutter speeds (listed from the fastest to the slowest speeds) include 1/1000, 1/500, 1/250, 1/125, 1/60, 1/30, 1/15, 1/8, 1/4, 1/2, and 1 second. Although speeds faster than 1 second are fractions of a second most cameras display them without the numerator. For example, 1/2 second is displayed as 2.

The Decisive Moment

Henri Cartier-Bresson is famous for his photographs that capture that "decisive moment" when random actions unfold into a single instant that makes an interesting photograph. His eye-hand coordination is unrivaled, and he was able to get the results he did because he was always ready. There was never any fumbling with controls and lost opportunities. Most digital cameras have an automatic exposure system that frees you from the worry about controls. However, these cameras have other problems that make decisive moments hard to capture.

There is a delay between the pressing the shutter release and the actual taking of the picture. This is because when you first press the button, the camera quickly performs a number of tasks. It first clears the CCD, corrects white balance to correct for color, meters and sets the exposure, focuses (on auto focus cameras) the image, and finally fires the flash (if needed) and takes the picture. All of these processing steps take time and the action may have passed it's peak by the time the picture is actually taken.

There is an even longer delay between pictures because the captured image must first be stored in the camera's memory. Because the image must first be compressed, a lot of processing is required and this can take a number of seconds, an eternity in action photography because you can't take another picture until the first is compressed and saved.

How To: Selecting a Shutter Speed

Look in your camera manual for a section on **shutter preferred** or **shutter priority mode**, or **shutter speeds**.

The Aperture Controls Light and Depth of Field

The aperture diaphragm, a ring of overlapping leaves within the camera lens, adjusts the size of the opening in the lens through which light passes to the image sensor. As it changes size, it affects both the exposure of the image and the depth of field in which everything is sharp.

Aperture and exposure

The aperture can be opened up to let in more light or closed (stopped down) to let in less. Like the shutter speed, the aperture is used to control exposure. The larger the aperture opening, the more light reaches the image sensor in a given period of time. The more light, the lighter the image.

The Way It Was: Early Apertures

A variety of designs in the past century and a half have enabled photographers to change the size of the lens opening. A form of the iris diaphragm, used in today's cameras, was used as early as the 1820s by Joseph Nicephore Niepce, one of the inventors of photography. Waterhouse stops, used in the 1850s were a series of blackened metal plates with holes of different sizes cut in them. To change apertures the photographer chose the appropriate one and slid it into a slot in the lens barrel. With wheel stops, different size apertures were cut into a revolving plate. The photographer changed the size of the aperture by rotating the plate to align the desired opening with the lens.

Aperture and depth-of-field

Like shutter speed, aperture also affects the sharpness of your picture, but in a different way. Changing the aperture changes the depth of field, the depth in a scene from foreground to background that will be sharp in a photograph. The smaller the aperture you use, the greater the area of a scene that will be sharp. For some pictures-for example, a landscape-you may want a smaller aperture for maximum depth of field so that everything from near foreground to distant background is sharp. But perhaps in a portrait you will want a larger aperture to decrease the depth of field so that your subject's face is sharp but the background is soft and out of focus.

A shallow depth of field can make part of an image stand out sharply against a softer background. This emphasizes the sharpest part of the image.

Great depth of field keeps everything sharp from the foreground to the background.

Understanding aperture settings

Aperture settings are called f-stops and indicate the size of the aperture opening inside the lens. Each f-stop lets in half as much light as the next larger opening and twice as much light as the next smaller opening. From the largest possible opening to increasingly smaller ones, the f-stops have traditionally been f/1, f/1.4, f/2, f/2.8, f/4, f/5.6, f/8, f/11, f/16, f/22, f/32, f/45. No lens has the full range of settings; for example, the standard lens on a digital camera will range from about f/2 to about f/16. Notice that as the f-stop number gets larger (f/8 to f/11, for example), the aperture size gets smaller. This may be easier to remember if you think of the f-number as a fraction: 1/11 is less than 1/8, just as the size of the f/11 lens opening is smaller that the size of the f/8 opening.

How wide you can open the aperture, referred to as its "speed," depends on the len's maximum aperture (its widest opening). The term "fast lens" usually applies to lenses that can be opened to a wide maximum aperture for the focal length. For example, a lens with a maximum aperture of f/2.6 opens wider, and is faster, than a lens with a maximum aperture of f/4. Faster lenses are better when photographing in dim light or photographing fast moving subjects. With zoom lenses the maximum aperture changes as you zoom the lens. It will be larger when zoomed out to a wide angle, and smaller when zoomed in to enlarge a subject.

How To: Selecting an Aperture

Look in your camera manual for a section on **aperture preferred** or **aperture priority**, or **apertures**.

Using Shutter Speed and Aperture Together

Both shutter speed and aperture affect the exposure, the total amount of light reaching the image sensor, and so control a picture's lightness or darkness. The shutter speed controls the length of time the image sensor is exposed to light and the aperture controls the brightness of that light. You, or the camera's autoexposure system, can pair a fast shutter speed (to let in light for a short time) with a wide aperture (to let in bright light) or a slow shutter speed (long time) with a small aperture (dim light). Speaking of exposure only, it doesn't make any difference which of the combinations is used. But in other ways, it does make a difference, and it is just this difference that gives you some creative opportunities. You're always balancing camera or subject movement against depth of field. This is because a change in one causes a change in the other. Let's see why.

Each setting is 1 "stop" from the next and lets in half or twice the light of the next setting. A shutter speed of 1/60 sec. lets in half the light that 1/30 sec. does, and twice the light of 1/125 sec. An aperture of f/8 lets in half the light that f/5.6 does, and twice the light of f/11. If you make the shutter speed 1 stop slower (letting in 1 stop more light), and an aperture 1 stop smaller (letting in 1 stop less light), the exposure doesn't change. However, you increase the depth of field slightly and also the possibility of blur.

For general shooting you need a medium shutter speed (1/60 sec. or faster) and a medium aperture (f/5.6 or smaller). Slower shutter speeds will show up on the image as overall blur unless you support the camera, perhaps with a tripod.

- For fast-moving subjects you need a fast shutter speed (although the focal length of the lens you are using, the closeness of the subject, and the direction it's moving also affect motion).

- For maximum depth of field, with the entire scene sharp from near to far, you need a small aperture (although the focal length of the lens and the distance to the subject also affects depth of field).

An Analogy

One way to think of shutter speeds and apertures is as faucets. You can fill (expose) a bucket with a small faucet opening (aperture) over a long time (shutter speed), or a large faucet opening in a shorter period. No matter which combination you choose, the bucket can be filled the same amount.

Photographing these fast-moving Blue Angels from the deck of a moving boat took a fast shutter speed to prevent blur caused by subject or camera movement. Great depth of field was also needed to keep the boats in the foreground and background sharp.

Choosing Exposure Modes

Many cameras offer more than one exposure mode. In fully automatic mode the camera sets the shutter speed and aperture to produce the best possible exposure. However, there are two other automatic exposure modes that are widely used in photography-aperture-priority and shutter-priority. All modes give equally good results in the vast majority of photographic situations. However, when you photograph in specific kinds of situations, these alternate exposure modes may have certain advantages.

Let's take a look at each of the available modes.

- **Fully Automatic** mode sets the shutter speed and aperture, white balance, and focus without your intervention. This mode allows you to shoot without paying attention to settings so you can concentrate on composition and focus.

- **Programmed mode** lets you select from a variety of situations such as portrait, landscape, or sports. The camera then sets the aperture and shutter speed for these situations.
- **Aperture priority** (or aperture preferred) mode lets you select the aperture (lens opening) needed to obtain the depth of field you want and the exposure system automatically sets the shutter speed to give you a good exposure. You select this mode whenever depth of field is most important. To be sure everything is sharp, as in a landscape, select a small aperture. The same holds true for close-up photography where depth of field is a major concern. To throw the background out of focus so it's less distracting in a portrait, select a large aperture.
- **Shutter priority** (or shutter priority) mode lets you choose the shutter speed you need to freeze or deliberately blur camera or subject movement and the camera automatically sets the aperture to give you a good exposure. You select this mode when the portrayal of motion is most important. For example, when photographing action scenes, such as those encountered by wildlife photographers, sports photographers, and photojournalists, shutter-priority mode might be best. It lets you be sure your shutter speed is fast enough to freeze the action or slow enough to blur it
- **Manual mode** lets you select both the shutter speed and the aperture.

One of the things that makes photography so enjoyable is the chance you get to interpret a scene in your own way. Shutter speeds and aperture controls are two of the most important ways you have of making a picture uniquely your own. As you become more familiar with their effects on a picture, you will find yourself making choices about them more instinctively: knowing, for example, that you want only the main subject sharp and so turning to a larger aperture.

Photographing the U. S. Constitution from the deck of a moving speedboat with a long lens took a fast shutter speed.

Here the shutter speed was fast enough to freeze the central dancer but slow enough to blur the others. This makes the central dancer the most important person in the photograph and also conveys a feeling of motion.

Leaving the shutter open for an extended period of time, leaves light trails in the image created by the taillights of a passing car.

How To: Changing Exposure Modes

Look in your camera manual for sections on **aperture preferred/priority mode**, **shutter preferred/priority mode**, **automatic mode**, **program mode**, **shutter speeds**, and **apertures**.

2. Fine Tuning Sharpness

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One of the first things you notice about a photograph is whether or not it is sharp. Extremely sharp photographs reveal a richness of detail, even more than you would normally notice in the original scene. If the entire image isn't sharp, your eye is immediately drawn to the part that is.

When learning to control sharpness, the first goal is to get pictures sharp when you want them sharp. If your photos aren't as sharp as you want them to be, you are probably experiencing one of the following effects:

- **Focus**. If nothing in your image is sharp or if your central subject is not sharp but other parts of the photograph are, your camera was improperly focused.
- **Depth of Field**. If your central subject is sharp but the background or foreground is less so, you probably didn't use a small enough aperture to get the depth of field you wanted.
- **Camera Movement**. If the image is blurred all over, with no part sharp, the camera moved during the exposure. Some dots appear as lines and edges blur as the image is "painted" onto the moving image sensor.
- **Subject Movement**. When some of the picture is sharp but a moving subject appears blurred, the cause is too slow a shutter speed.

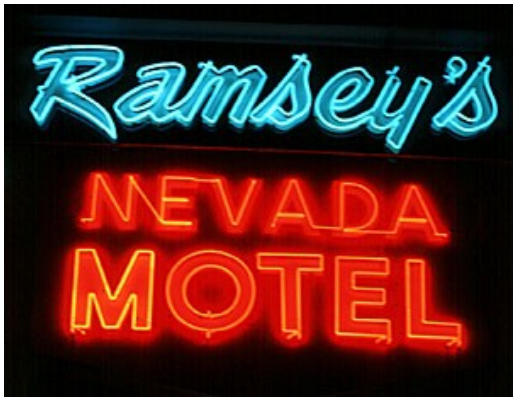
Eliminating Camera Movement

Unwanted camera movement during the exposure is probably the major cause of unsharp photographs. You can reduce this problem in bright light and when using flash simply by holding the camera steady and depressing the shutter release smoothly. At slow shutter speeds, such as those you get in dim light, particularly with a lens zoomed in to enlarge a subject, you need a camera support.

As you zoom your lens in on a subject, you are increasing the lens's focal length. As you zoom back out, you're reducing it. The focal length, and the amount the image is magnified, determines the minimum shutter speed you need to use to hand-hold the camera and avoid blur. The rule of thumb is never to hand-hold the camera at a shutter speed lower than your lens' focal length.

Supporting a camera

When the light is dim, and you aren't using flash, you need to support the camera or you'll get blur in your images. One way to do this is to lean against a wall or tree and brace yourself with your elbows tight to your body. You can also find a branch or railing to rest the camera on. For real stability you need a small tripod or an even easier to carry monopod.



The camera was steady in the left picture and moved in the right one.

Holding the camera correctly, bracing it, and breathing correctly can also reduce camera motion. Use the optical viewfinder to take photos because you can brace the camera against your face instead of holding it out at shaky arms' length. Just before taking a shot, inhale deeply, then exhale and hold your breath while smoothly depressing the shutter-release button. When holding the camera for both horizontal and vertical photographs use your right finger to press the shutter-release button and your left hand to support the camera.

Using the self-timer or remote control

Almost all digital cameras have a self-timer and a few have a remote control. Although often used to give you time to get into the picture, the self-timer is also a great way to reduce blur when photographing in dim light. Just place the camera on a secure surface, compose the image, and use the timer or remote to take the exposure.

Increasing sensitivity

To reduce blur caused by camera movement, some cameras let you increase the image sensor's sensitivity (or ISO) to light although this adds some grain to the image. Increasing the sensitivity means less light is needed for a picture so the shutter speed is higher. Increasing sensitivity is a good way to get pictures without flash in places such as concerts and museums where flash is prohibited.

> **How To: Reducing Blur**
>
> Check your camera manual for a section on the **self-timer**, **remote control**, or **increasing sensitivity**.

Sharpness Isn't Everything

Your photos don't always have to be sharp to be effective. In many cases, it's better to have part of the scene sharper than the rest. Your pictures can be sharp or unsharp in different ways. The first way concerns motion. Several factors affect the way motion is captured in images. These include your image sensor's speed, the overall brightness of the scene, lens focal length, and subject speed, direction, and distance. Another kind of sharpness concerns depth of field, how much of the scene will be sharp in the image. Even if you are photographing a static scene, your picture may not be sharp if you do not have enough depth of field. However, a shallow depth of field can be used to make a busy background less distracting by having it out of focus in the picture. Several factors affect

depth of field, including lens aperture, lens focal length, and subject distance.

Motion in a scene can be frozen or blurred depending on the shutter speed and other factors Blur can be used creatively to evoke a feeling of motion as in this shot of a waterfall in Yosemite National Park.

Shallow depth of field can focus attention on a foreground subject by making the background less sharp.

How to Photograph Motion Sharply

The sharpness of different parts of an image helps direct the viewer who tends to look first at the most sharply focused part of the picture. In addition, sharpness itself can be part of the message of the photograph. The immobility of a frozen figure can be made more apparent by blurring people moving in the background.

Blur in an image is caused when all or part of a subject focused onto the image sensor moves when the shutter is open. To show a moving subject sharply, the shutter needs to open and close before the image on the sensor moves a significant amount. In other words, you need to use a fast shutter speed. But just how fast is fast enough? The answer depends on several factors. Because several variables are involved, you can't always predict how motion will be portrayed in the final photograph. So take more than one shot if possible. Try shooting from a different angle or perhaps wait for a pause in the action. You are much more likely to get a good shot if you have several to choose from.

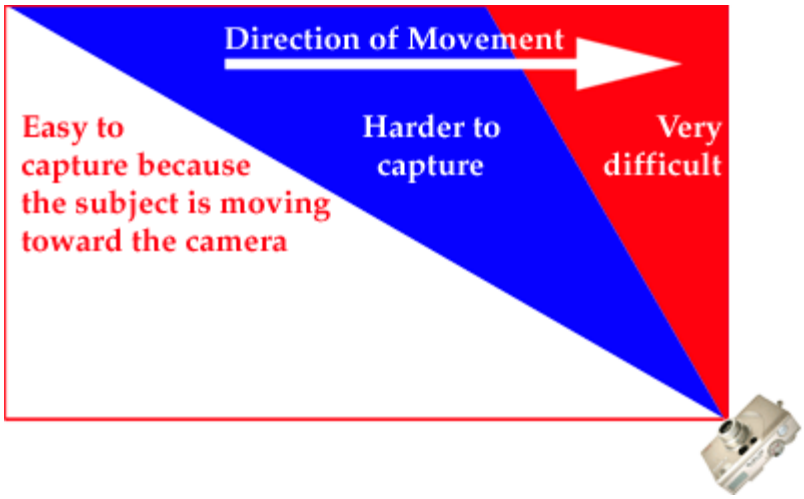
Speed of subject

The faster a subject is moving, the faster the shutter speed you need for a sharp image. However, it's not the speed of the subject in the real world that determines blur. It's how far the subject moves on the image sensor while the exposure is being made. This depends not just on the subject's actual speed, but also on the direction of its movement, its distance from the camera, and how far the lens is zoomed.

The shutter speed froze the central dancer but was slow enough to blur the others. This makes the central dancer the most important person in the photograph.

Direction of movement

When the shutter is open, a subject moving parallel to the image sensor will cross more of the pixels on the sensor and be more blurred than a subject moving directly toward or away from the camera. This is why you can use a slower shutter speed to sharply photograph a child who is running toward, or away from you, and not the same child running from one side of the scene to the other.



How sharp a subject appears depends partly on it's direction of movement.

Distance to subject and focal length of lens

If a subject is close to the camera, even slight movement is enough to cause blur. A subject—or part of one—far from the camera can move a considerable distance before its image on the image sensor moves very much. The focal length of the lens can also affect the apparent distance to the subject. Increasing the focal length of your lens—for example, zooming in on a subject—has the same effect as moving closer to your subject. The more you are zoomed in on it, the less a subject has to move in order to have its image move on the image sensor and become blurred.

To visualize the effects of distance on blur, look out the side window of a speeding car (but not when you're driving). The objects in the foreground seem to fly by while those on the horizon don't seem to move at all.

On this speeding train, the part closest to the camera looks the most blurred while the farthest part looks sharper. Since all parts of the train are moving at the same speed, this shows how distance affects blur.

How To: Increasing Sharpness of Moving Objects

- Photograph fast moving subjects heading toward or away from you.
- Move farther back from the subject.
- Zoom the lens to a wider angle of view.
- Switch to shutter priority mode and select a fast shutter speed such as 1/500.

- Increase the sensor's sensitivity to light although this adds some grain to the image.

Focus and Depth of Field

If you look around you—the book in your hand, the chair across the room, the far wall—everything seems to be sharp. That is because your eyes refocus every time you look at an object at a different distance. But the sharpness you see when you glance at a scene is not always what you get in a photograph of that scene. To understand why not, you have to understand focus and depth of field.

Focus

Focus is only one of the factors affecting the apparent sharpness of your photographs, but it is a critical one because it determines which parts of the picture will be sharpest—called the **plane of critical focus**. The

plane of critical focus in your image will be the area that falls within the focus area in the center of the viewfinder when you press the shutter-release button halfway down. You will have much more control over the final image if you understand how focus relates to the overall sharpness of a scene.

Imagine the part of the scene on which you focus as a flat plane (much like a pane of glass) superimposed from one side to the other of a scene, so that the plane is parallel to the back of the camera or the image sensor. Objects falling exactly on this imaginary plane will be in critical focus, the sharpest part of your picture. This plane of critical focus is a very shallow band and includes only those parts of the scene located at identical distances from the camera. As you point an autofocus camera at objects nearer or farther away in the scene, the plane of critical focus moves closer to or farther from the camera. As the plane moves, various objects at different distances from the camera come into or go out of critical focus.

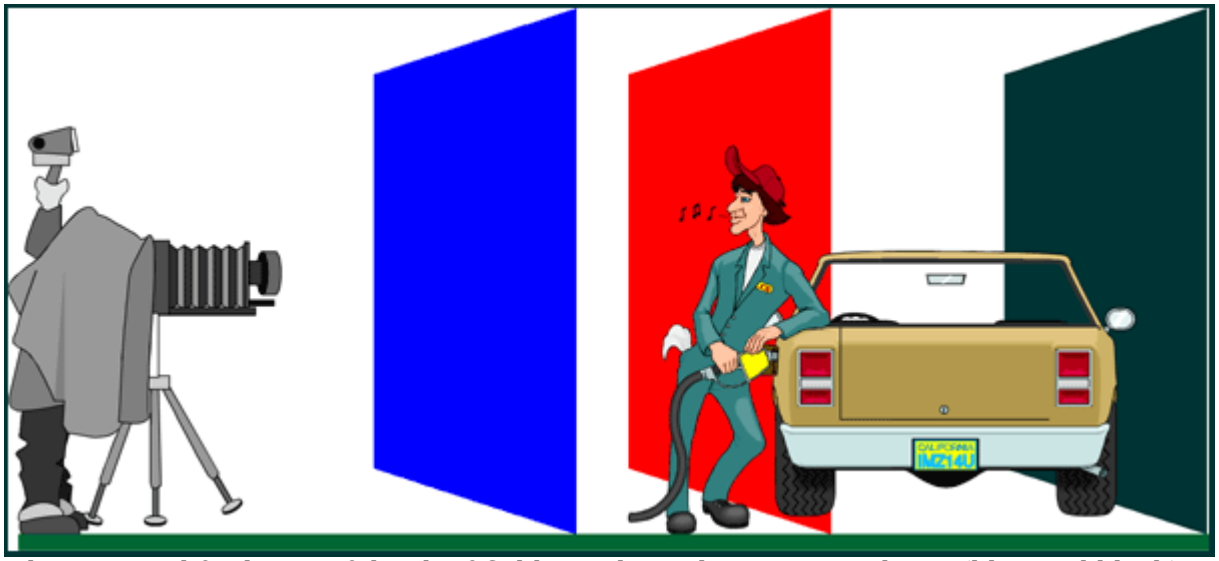
Depth of field

A lens can only bring objects at a single distance from the camera into critically sharp focus. But if you look at photographs, you can see a considerable area of the scene from near to far that appears sharp. Even though theoretically only one narrow plane is critically sharp, other parts of the scene in front of and behind the most sharply focused plane appear acceptably sharp. This area in which everything looks sharp is called depth of field. Objects within the depth of field become less and less sharp the farther they are from the plane of critical focus. Eventually they become so out of focus that they no longer appear sharp at all.

Often it doesn’t matter so much exactly what you are focused on. What does matter is whether or not all of the objects you want to be sharp are within the depth of field so they appear sharp. If you want a large part of the scene to be sharp, you can increase the depth of field. You can decrease it if you want less of the scene sharp. In some scenes, you can significantly increase or decrease the depth of field simply by shifting the point on which you are focused or by changing the aperture setting.

Tip

To control depth of field, switch to aperture preferred mode and select a small aperture for great depth of field or a large aperture for shallow depth of field.



The near and far limits of depth of field are shown here as two planes (blue and black), parallel to the plane of critical focus (red). Actually, they are usually not visible as exactly defined boundaries. Nor can you usually find the plane of critical focus by looking at a picture. Instead, sharp areas imperceptibly merge into unsharp ones. Notice that in the diagram the depth of field is not evenly divided. At normal shooting distances, about one-third of the depth of field is in front of the plane of critical focus (toward the camera), and two-thirds is behind it (away from the camera). When the camera is focused very close to an object, the depth of field becomes more evenly divided.

Focus Settings

Most digital cameras have an autofocus system that automatically adjusts the focus to make the subject in the center of the viewfinder appear critically sharp. However, some cameras provide other ways to focus and this is a good thing. Autofocus often has trouble focusing in scenes with little contrast, when the object in the focus point is brighter than the rest of the scene, when the subject is poorly illuminated, when both near and distant objects fall within the focus point, or when the subject is moving quickly. If the camera can't focus, some cameras beep or blink a lamp. If this happens, use focus lock to focus on a subject at the same distance. Some cameras also let you switch to manual focus.

How To: Changing the Focus Method

Look in your camera manual for a section on **focus-lock**, **manual focus**, or **focus controls**.

Using focus lock

To change the position of the plane of critical focus, you can use a procedure called focus lock. Most digital cameras have a two-stage shutter-release button. When you press it down halfway, it sets focus, exposure and white balance. Some cameras beep and illuminate a lamp when these readings are locked in. If you don't release the shutter-release button you can then point the camera anywhere else in the scene and the settings remain unchanged. This lets you set the focus at any distance from the camera to control both focus and depth of field.

How To: Using Focus Lock

1. In record mode, point the camera so the item you want to lock on is in the focus area in the center of the viewfinder.

2. Press the shutter-release button down halfway and hold it there to lock in the focus.

3. Without releasing the shutter-release button, recompose the scene and press the shutter-release button the rest of the way to take the picture.

A small aperture gave enough depth of field to keep both foreground and background figures sharp.

Controlling Depth of Field

Sharpness—or the lack of it—is immediately noticeable when you look at a photograph. If you are making a portrait, you want only the person to be sharply focused, but not a distracting background. In a landscape, on the other hand, often you will want everything sharp from close-up rock

to far away mountain. Once you understand how to control depth of field, you will feel much more confident when you want to make sure something is—or isn't—sharp.

Here the greatest possible depth of field was used to keep everything sharp from the fighter's needle nose to the background.

To control how deep or shallow depth of field is, you have three factors to work with.

- **Aperture size**. The smaller the size of the lens aperture (the larger the f-number), the greater the depth of field. The larger the aperture, the shallower the depth of field.
- **Camera-to-subject distance**. As you move father from the subject you are focused on, you increase depth of field. As you move closer, you decrease it.
- **Lens focal length**. Zooming out to a wider angle of view increases depth of field. Zooming in decreases it.

Each of these three factors affects depth of field by itself, but even more so in combination. You can get the shallowest depth of field with a lens zoomed in on a nearby subject using a large aperture. You get the deepest depth of field when you are far from a subject, with the lens zoomed to a wide angle, and using a small aperture.

Here the camera's depth of field was just deep enough to keep the legs in focus. Parts of the image closer to the camera and further away become increasingly less sharp.

Capturing Maximum Depth of Field

Many times when you are photographing you will want to get as much depth of field as possible because important parts of a scene are both near to and far from the camera, and you'll want all of them to be sharp. Maximum depth of field seems particularly important for photographs of landscapes and other scenes where a distant horizon is a part of the picture.

When a subject extends to the far distance, many photographers unthinkingly focus on that part of the scene—or on infinity. Infinity in photographic terms, is an inclusive term that designates everything from about 40 ft. to as far as you—or the lens—can see. So when you are focused on infinity everything from that point and beyond will be sharp. But since one-third of the available depth of field falls in front of the point on which you are focused and two-thirds behind it, focusing on infinity wastes two-thirds of your depth of field because everything from the infinity point and beyond is going to be sharp anyway. That may mean that some other part of the scene in the foreground will not be included in the one-third remaining depth of field and consequently will not be sharp.

Here a wide-angle lens was used with a small aperture to keep everything in the foreground and background in focus. The flowers are on Pike's Peak, over 14,000 feet up in the Rocky Mountains of Colorado.

Instead of focusing on infinity, if you focus on some object one-third of the way between you and the horizon, you will have brought forward the point on which you are focused and so increased the depth of field in the foreground of your picture. This new point of focus is called the hyperfocal distance.

How To: Increasing Depth of Field

- Photograph in bright sun so the aperture closes down.
- Zoom the lens out to a wider angle of view.
- Move farther away from the subject.

- Switch to aperture priority mode and select a small aperture such as f/11.

How To: Using Focus Lock for Maximum Depth of Field

1. Point the camera so the area you want to focus on is in the focus area in the center of the viewfinder. In a landscape, pick something about one-third of the way between you and the horizon. For other scenes, pick something to focus on that's one-third of the way back from the nearest point you want to be sharp.

2. Press the shutter-release button down halfway and hold it there to lock in the focus.

3. Recompose the scene and press the shutter-release button the rest of the way to take the picture.

Using Selective Focus

Imagine you are photographing a scene something like the one below. Which part of the scene are you most interested in? Chances are it's the cattails and not the objects in the background. One way to make something stand out is to photograph it so it will be sharper than its surroundings. When everything in a picture is equally sharp, the viewer tends to give equal attention to all parts of the scene. But if some parts are sharp and others are not, the eye tends to look first at the sharpest part of the image.

Here a small aperture kept both the foreground and background sharp.

Here a large aperture kept the foreground sharp but softened the background.

You can selectively focus the camera and your viewer's attention on the most important part of the scene if you restrict the depth of field so that the significant elements are sharp while the foreground and background are less so.

How To: Using Focus Lock for Minimum Depth of Field

1. Zoom the lens in to magnify the subject or move close to it and focus the camera on, or slightly in front of, the subject you want sharpest.

2. Press the shutter-release button down halfway and hold it there to lock in the focus.

3. Recompose the scene and press the shutter-release button the rest of the way to take the picture.

How To: Decreasing Depth of Field

- Photograph in dim light to open up the aperture.
- Zoom the lens in to enlarge the subject.
- Move closer to the subject.

- Switch to aperture priority mode and select a large aperture such as f/4.

Conveying the Feeling of Motion

Blur can contribute a feeling of motion in the image that may be missing from a more static shot. A slow shutter speed or one of the other techniques described here causes a moving subject to move across the image sensor during the exposure causing a blur can clearly say: Motion! These techniques often work best with a long lens or a big subject so the subject doesn't look too small in the image. One place to begin is to shift to shutter-preferred mode and pick a slow shutter speed. You can use this setting to deliberately blur moving objects such as running water.

Panning the camera as this young great blue heron took off blurred the background.

Panning the camera in the same direction as a moving subject produces an image where the subject is relatively sharp against a blurred background. Your movement should be smooth and controlled to get a good pan, so begin to pan the camera before the subject enters your viewfinder. Smoothly depress the shutter release as you follow the motion of the subject, keeping it in the same position in the viewfinder. Follow through as you would in golf or tennis. Panning takes practice so take as many images as you can and erase those that don't work. Results are quite unpredictable here because your body motion adds yet another variable to the final picture.

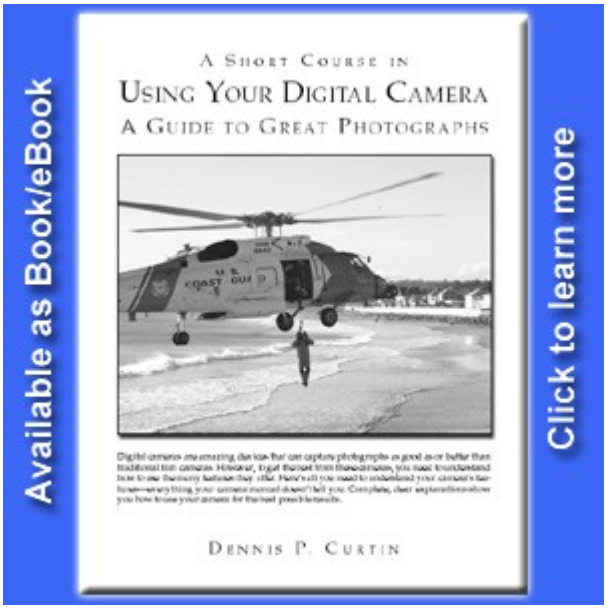
Panning the camera as this barred owl took off blurred the background.

How To: Conveying Motion

- Try blurring images in low-light situations. In bright light, the shutter will open and close too fast.
- Switch to shutter priority mode and select a slow shutter speed.

- In some situations, you may want to turn the flash off when trying to blur nearby subjects.

3. Fine Tuning Exposure



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Controlling Brightness and Contrast

Automatic exposure control is one of the most useful features of your camera. The convenience of having the camera automatically mea- sure the brightness of the light, then set the correct shutter speed and aperture will be particularly evident to you if you have ever used a camera that did not function automatically in that way. It means you can often let the camera deal with the exposure while you concentrate on the image. This is especially helpful when photographing action scenes where there isn't time to evaluate the situation and then set the controls manually.

You shouldn't, however, always leave the exposure to the automatic system. Automatic exposure works well in most, but not all, lighting conditions. At times the lighting can fool any automatic exposure system into producing an underexposed (too dark) or overexposed (too light) image. Although you can make adjustments to a poorly exposed image in a photo-editing program, you've lost image information in the shadows or highlights that can't be recovered. You will find it better in some situations to override the automatic exposure system at the time you take the picture.

Typical situations in which you might want to override automatic exposure include interesting and unusual lighting situation. For example, if you want to photograph into the sun, record a colorful sunset, show the brilliance of a snow-covered landscape, or convey the dark moodiness of a forest, you will probably need to adjust exposure, rather than let the camera make exposure settings automatically.

How Your Meter Works

All light meters, including the one built into your digital camera, operate on the same general principles. A light-sensitive photocell regulates the

amount of electricity flowing in the metering system. As the intensity of the light reflected from the subject changes, the amount of electricity flowing through the photocell's circuits changes and is used by the autoexposure system to calculate and set the shutter speed and aperture.

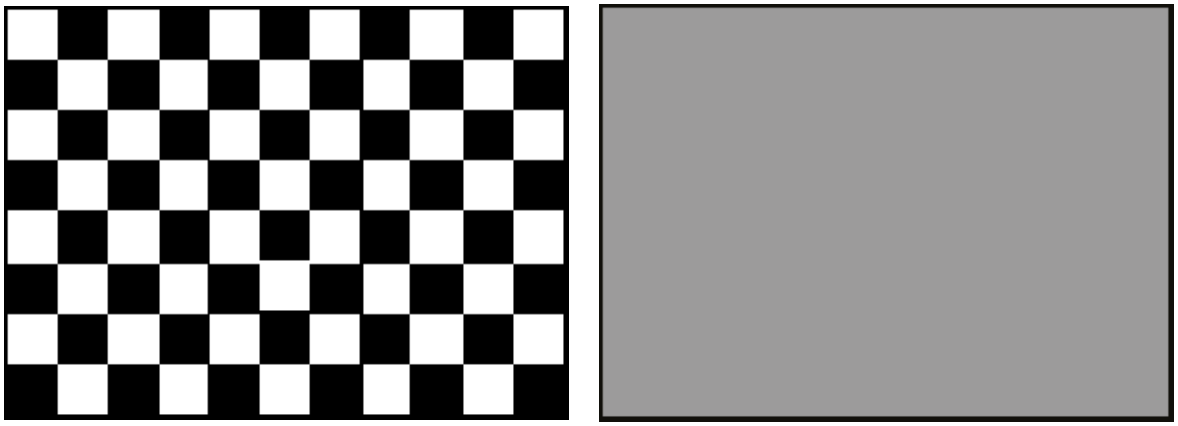
Your camera's meter measures light reflecting from the part of the scene shown in the viewfinder or on the LCD panel. The coverage of the meter (the amount of the scene that it includes in its reading) changes just as your viewfinder image changes, when you change your distance relative to the scene or when you zoom the lens. Suppose you move close or zoom in and see in your viewfinder only a detail in the scene, one that is darker or lighter than other objects nearby: the suggested aperture and shutter speed settings will be different than if you meter the scene overall from farther away.

Meter averaging and middle gray

Your exposure meter doesn't "see" a scene the same way you see it. Its view is much like yours would be if you were looking through a piece of frosted glass.

Your meter sees scenes as if it were looking at them through a piece of frosted glass. It doesn't see details, just averages.

Every scene you photograph is something like a checker board (below), but even more complex. Portions of it are pure black, pure white, and every possible tone in between. Regardless of the elements making up the scene, you camera's meter can average and measure brightness only.



Where you see a black and white checkerboard (left), your camera sees only an average gray (right).

The exposure meter and exposure control system in an automatic camera can’t think. They do exactly what they are designed to do and they are designed to do only one thing. Regardless of the scene, its subject matter, color, brightness, or composition, the meter measures the overall amount of light reflecting from the scene. Since the light meter measures only brightness (how light or dark the scene is) and not color, the automatic exposure system then calculates and sets the aperture and the shutter speed to render this level of light as "middle gray" in the photograph. Most of the time this works very well because most scenes have an overall reflectance that average out to middle gray. But some scenes and situations don’t average out to middle gray and that’s when autoexposure will lead you astray.

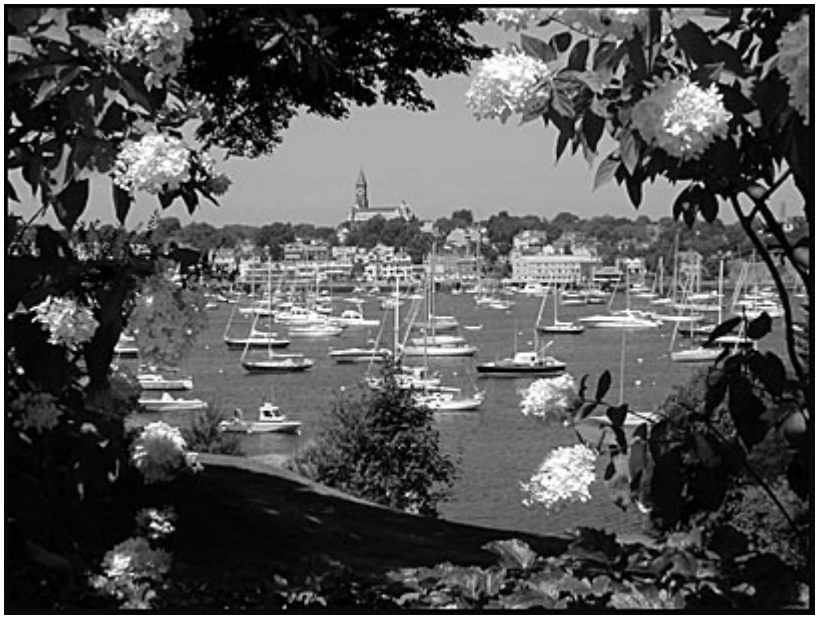
A continuous spectrum of tones, ranging from pure black at one end to pure white at the other is contained in most scenes. In simple terms, this continuous scale can be thought of as dividing into a series of individual tones called a gray scale. Each of the tones in this scale has received 1 stop more exposure than the next darkest tone in the series, and one stop less exposure than the next lightest tone. The tone in the middle is called middle gray. A subject uniformly of this tone reflects exactly 18% of the light falling on it.

The gray scale is a series of steps reflecting different levels of brightness.

When you photograph a subject with an overall tone of middle gray, your camera’s autoexposure system will set an exposure so that the subject will appear in the final image as middle gray. When you photograph subjects that have an overall tone lighter or darker than middle gray they will also be middle gray in the final image and therefore look too light or dark. As a result, if you photograph first a white card, then a gray card,

and third a black card, and each completely fills the viewfinder frame when the exposure is calculated, each of the cards will be middle gray in the captured image.

The gray scale is hard to see when looking at a scene in color.



It takes practice, but you can learn to see the way your camera does, in shades of gray.

To make scenes that don’t average out to middle gray appear in an image the way they appear in real life, you have to use exposure compensation or some other form of exposure control to lighten or darken the picture.

Types of metering

All parts of a scene are usually not equally important when determining the best exposure to use. In a landscape, for instance, the exposure of the foreground is usually more important than the exposure of the sky. For this reason some cameras offer more than one metering method. The choices might include the following:

- **Matrix** metering divides the image area into a grid and compares the measurements against a library of typical compositions to select the best possible exposure for the scene.
- **Center-weighted** meters the entire scene but assigns the most importance to the center quarter of the frame where the most important objects usually are located.
- **Bottom-weighted** meters the entire scene but assigns the most importance to the bottom of the frame where the most important objects usually are located.
- **Spot** evaluates only the area within a small area in the middle of the viewfinder. This allows you to meter just a specific part of the scene instead of relying on an average reading. This mode is ideal when photographing a subject against a bright or dark background.

In this image, automatic exposure worked well because the scene averages out to middle gray.

Meter weighting can cause a few problems. For instance, a dark object located off center against a very light background may not be exposed properly because it is not located in the area the meter is emphasizing. Or, in some cases, holding the camera vertically may give undue emphasis to one side of the scene. These occasions are uncommon, but when they occur you can ensure accurate readings and exposure settings by metering the subject from close-up. The camera settings can then be overridden if necessary to produce a well-exposed photograph.

How To: Changing the Metering Mode

Look in your camera manual for a section on **metering methods** or **spot metering**.

How Exposure Affects Your Images

When you take a photograph, the exposure isn't uniformly distributed over the sensor's surface—unless you are photographing a subject that is absolutely uniform in tone. Highlights (brighter areas) in the scene reflect the most light, and the areas of the sensor onto which they are focused are exposed a great deal. Darker areas, like shadows, reflect much less light, so the areas of the sensor onto which they are focused receive much less exposure. The perfect exposure retains details in both the highlights and shadows. For the autoexposure system, this is as difficult as your parking a very large car in a very small garage. If there is even a little too much exposure, the image is too light and details are lost in the highlights. If there is too little exposure the image is too dark and details are lost in the shadows.

One way to ensure you get the best exposure is to take three pictures. The first would be at the recommended setting. The second would be lighter and the third darker than the original one. This process is referred to as bracketing because you're bracketing the suggested exposure. You can do this using exposure compensation.

In this series of photographs you can see the effect of exposure on the image. The middle photo is correctly exposed. The left photograph was overexposed and is too light. The right photo was underexposed and is too dark.

When Automatic Exposure Works Well

Most scenes that you photograph have an overall brightness of middle gray. Some areas of the scene may reflect 90% of the light and other parts may reflect 5%, but overall the average amount of light reflecting from the scene is 18%, the amount reflected by a middle gray subject.

Whenever you photograph a normal scene with this average brightness, your automatic exposure system exposes it correctly. Typical middle gray scenes include the following:

- Scenes in bright sunlight where the subject is front-lit by a sun that is behind you when you face the scene.
- Scenes on overcast days or under diffused light, such as in the shade or in evenly lit scenes indoors.

This image has detail in the lightest (highlight) and darkest (shadow) areas. If just a little darker or a little lighter details would be lost in the shadows or highlights.

How To: Taking a Picture in Automatic Mode

1. Turn the camera on and set it to automatic mode. Be sure to remove the lens cap.

2. Compose the image in the viewfinder making sure the subject that you want sharpest is in the focus area in the center of the viewfinder.

3. Press the shutter-release button halfway down so the camera can set focus, exposure, and white balance. When the camera has done so, a lamp may glow or the camera may beep.

4. Press the shutter-release button all the way down to take the picture. When you do so, the camera may beep. The camera then saves the new image onto the camera's flash card.

5. When done, turn the camera off.

When to Override Automatic Exposure

Let's take a look at some of the most common situations where your automatic exposure system will have problems. It's in these situations where you'll need to override the suggested exposure settings.

Scenes lighter than middle gray

Scenes lighter than middle gray, such as beach scenes, or bright sand or snow covered landscapes, reflect more than 18% of the light falling on them. The autoexposure system doesn't know the scene should look bright so it calculates an exposure that produces an image that is too dark. To lighten the image so it matches the original scene, you must override the camera's automatic exposure system to add exposure.

The snow scene here is typical of scenes that are lighter than middle gray. Most of the important tones in the scene are at the lighter end of the gray scale. The overall "average" tone would be about one stop brighter than middle gray. For a good picture you have to increase the exposure by one stop (+1) to lighten it. If you didn't do this, the snow in the scene would appear too gray (bottom).

Scenes darker than middle gray

Scenes that are darker than middle gray, such as deep shadows, dark foliage, and black cloth, reflect less than 18% of the light falling on them. Although such scenes are not as common as scenes lighter than middle gray, you will come across them occasionally. If you photograph such scenes using automatic exposure, they will appear too light. The meter cannot tell if the scene is dark or just an ordinary scene with less light falling on it. In either case it increases the exposure to make the scene lighter. When it does this, it overexposes the image and makes it too

light. To produce a picture with an overall tone darker than middle gray, you need to override the autoexposure system to decrease the exposure to make it darker.

The black cat is between one and two stops darker than middle gray. To darken the scene so the cat's not middle gray, exposure must be decreased by one (-1) or two (-2) stops.

Subject against very light background

Subjects against a very light background such as a portrait against a bright sky or light sand or snow, can confuse an automatic exposure system, particularly if the subject occupies a relatively small part of the scene. The brightness of the background is so predominant that the automatic exposure system reduces the exposure to render the overall brightness as a middle gray. The result is an underexposed and too-dark main subject.

Here the scene was underexposed to silhouette the people in the foreground. To show detail in the people, exposure would have had to have been increased two stops (+2).

Subject against very dark background

When a small light subject appears against a large dark background, your autoexposure system assumes the overall tone to be darker than it actually is, because so much of the scene is dark compared to the smaller brighter main subject. The autoexposure system increases the exposure to produce a middle tone. The result is an overexposed and too light main subject.

The rising sun illuminated only one boat in this harbor scene. If the exposure hadn't been reduced by two stops (-2), the background would be too light and the white boat would have been burned out and too white. A scene like this is a great place to use spot metering.

Scenes with high contrast

Many scenes, especially those with brightly lit highlights and deep shadows, have a brightness range that cannot be completely recorded on an image sensor. When confronted with such scenes, you have to decide whether the highlight or shadow area is most important, then set the exposure so that area is shown accurately in the final picture. In high contrast situations such as these, move close enough so the most important area fills the viewfinder frame. Use exposure lock from that position to lock in the exposure. Another way to deal with high contrast is to lighten the shadows by adding fill flash. A portrait, for example, lit from the back or side is often more effective and interesting than one lit from the front. But when the light on the scene is contrasty, too much of the person's face may be in overly dark shadow. In this case use fill flash or a white reflector card to fill and lighten the shadows.

Tip

In high contrast settings, some cameras let you decrease contrast at the time you take the picture.

The archway was in the shadows and dark while the cathedral was brightly lit by the sun. Both couldn't be exposed properly, so the archway was left as a solid black.

Hard to meter scenes

Occasionally it's not convenient or even possible to meter a scene. Neon street signs, spot lit circus acts, fireworks, moonlit scenes, and many similar situations are all difficult and sometimes impossible to meter. In these cases, it's easiest simply to experiment, using the exposure compensation control on your camera. After taking a picture at the suggested exposure, you use exposure compensation to take other exposures both lighter and darker than the suggested settings.

This scene has a bright sky and one brightly illuminated fisherman against a dark background. A scene such as this is hard to meter because of the variety of lighting.

A relatively small subject against a wide expanse of sky will almost always be underexposed unless you use exposure compensation.

How to Override Automatic Exposure

Most digital cameras provide one or more ways to override the automatic exposure system to get the exposure you want.

Exposure compensation

Exposure compensation lets you lighten or darken the photograph that the camera would produce if operated automatically. To lighten a picture, you increase the exposure; to darken one, you decrease the exposure. The amount you increase or decrease the exposure is specified in "stops." For example, to increase the exposure 1 stop, you specify +1 to open the aperture or slow down the shutter speed. It’s easy to use exposure compensation because you can preview your changes on the LCD monitor.

+2 **+1** **0** **-1** **-2**

To make changes to exposure, you use exposure compensation control where you can often increase or decrease exposure by two stops in one-third stop increments. Here are some typical settings where you'd make these changes.

- **+2** is used when the light is extremely contrasty and important shadow areas are much darker than brightly lit areas.
- **+1** is best for sidelit or backlit scenes, beach or snow scenes, sunsets and other scenes that include a bright light source, or very light objects, such as a white cat on a white pillow.
- **0** (the default) is best for scenes that are evenly lit and when important shadow areas are not too much darker than brightly lit areas.
- **-1** is for scenes where the background is much darker than the subject, such as a portrait in front of a very dark wall. Also good for very dark objects, such as a black cat on a black pillow.
- **-2** is for scenes of unusual contrast, as when an extremely dark background occupies a very large part of the image and you want to retain detail in the brighter parts of the scene.

Tip

Use + exposure compensation when the subject is bright and - when it's dark.

How To: Using Exposure Compensation

Look in your camera manual for a section on exposure compensation. Many cameras let you select a setting from -2 to +2 stops in increments of 1/3 of a stop. The LCD monitor will display the result of the changes. If you select a + value, the scene will look brighter. If you select a – value it will look darker. *

Exposure lock

Just as you can point the camera at an object and press the shutter-release button halfway down to lock in focus, so you can with exposure. For example, with a gray barn sitting in a white snow-covered field, you can use spot metering or move closer to meter just the barn and hold down the shutter-release button to lock in that reading. You can continue holding the button half way down and recompose the picture using the locked in exposure and focus setting.

How To: Using Exposure Lock

1. Point the camera so the subject that you want to lock exposure on is in the focus area in the center of the viewfinder.

2. Press the shutter-release button down halfway and hold it there to lock in the exposure.

3. Without releasing the shutter-release button, recompose the scene and press the shutter-release button the rest of the way to take the picture.

Controlling Brightness and Contrast

Some cameras let you adjust the contrast and brightness in your photographs; also referred to as adjusting the tone curve. To visualize the effects these controls can have, adjust the brightness and contrast settings on your TV or computer monitor. Some cameras allow you to adjust brightness and contrast at the time you take a picture. With others, you can only do it later using a photo-editing program.

Brightness

Brightness raises or lowers the brightness of the entire scene to make everything lighter or darker.

Decreasing brightness darkens an image (left) while increasing it lightens it (right).

Contrast

Contrast adjusts the differences between the brightest and darkest areas in the image. You can increase or decrease the contrast.

Decreasing contrast makes colors in the image look more muted and "flatter" (left) while increasing it makes it look sharper and crisper (right).

How To: Adjusting Brightness and Contrast

Look in your camera manual for sections on brightness, contrast, or tone curves.

4. Capturing Light and Color

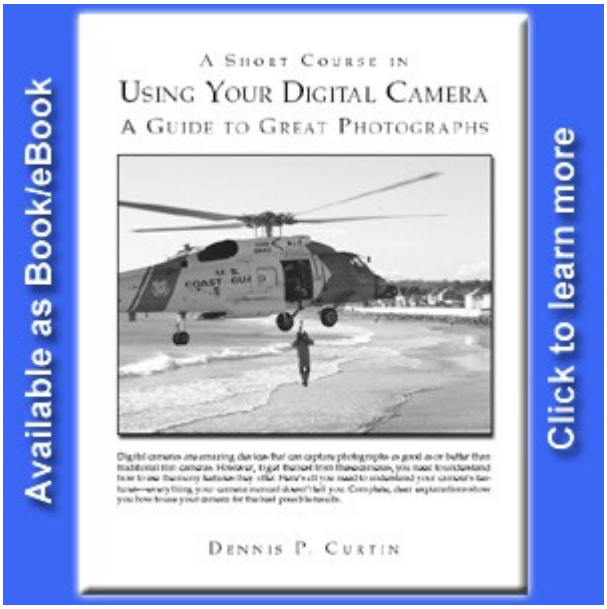


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Image sensors in digital cameras are designed to produce colors that match those in the original scene. However, there is a lot of variation among sensors and among the circuits and software that process raw images into final photographs. The results you get depend, in part, on the accuracy with which you expose the image and the match between the

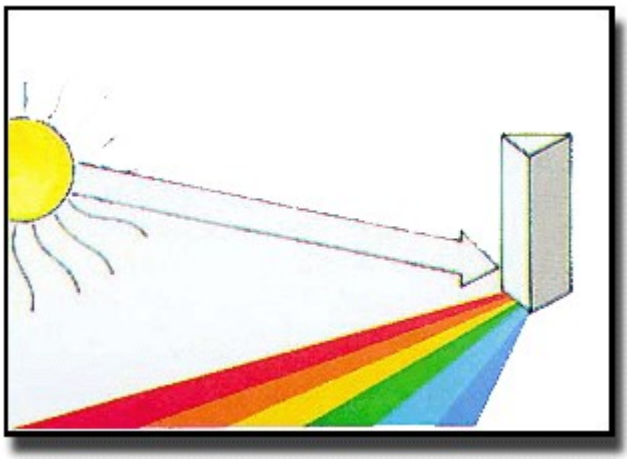
color balance of the sensor and the color balance of the light illuminating your subject.

With film cameras, photographers usually explore a wide variety of films before settling on the one or two they like best. This is because each film type has it’s own unique characteristics. In some the grain is small, in others it’s larger. A film may have colors that are warmer than other films, or slightly colder. These subtle variations among films are slight but noticeable and photographers gravitate to one or the other. With digital cameras, you don’t have the same choice offered by film cameras. The "film" in the form of an image sensor is built into your camera. Whatever its characteristics are, they are the characteristics you have to live with until you buy another camera.

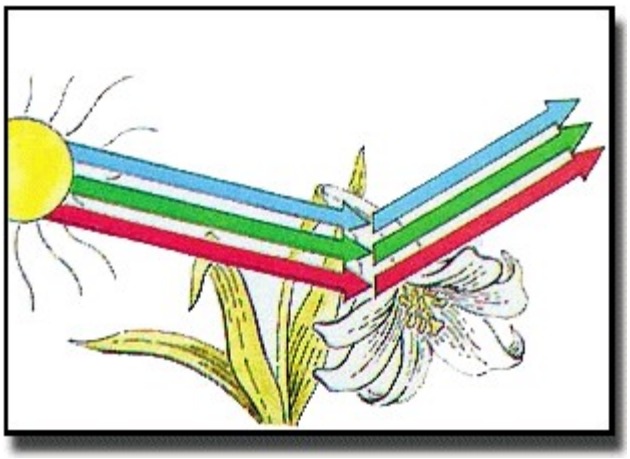
In this chapter, we explore the world of color and how you manage it in your photos.

Where Does Color Come From

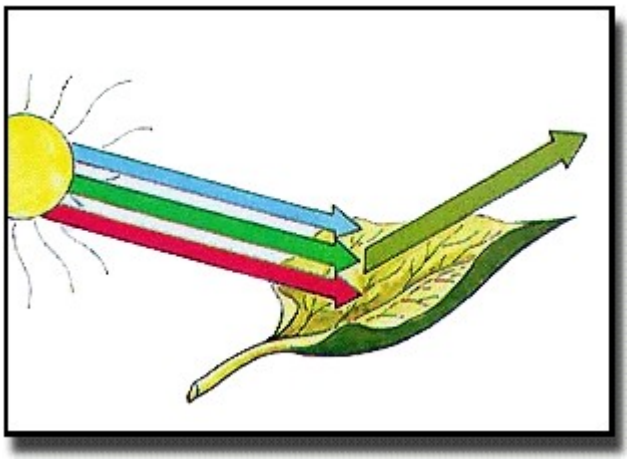
Why do we see colors? Light from the sun or from a lamp seems to have no particular color of its own. It appears simply to be "white" light. However, if you pass the light through a prism, you can see that it actually contains all colors, the same effect that occurs when water droplets in the atmosphere separate light into a rainbow. A colorful object such as a leaf appears green because when white light strikes it, the leaf reflects only the green wavelengths of light and absorbs the others. A white object such as a white flower appears white because it reflects most of the wavelengths that strike it, absorbing relatively few. Inks, dyes, or pigments in color prints also selectively absorb and reflect certain wavelengths of light and so produce the effect of color.



Although light from the sun appears colorless or "white," it actually contains a range of colors similar to a rainbow. You can see these colors using a prism to separate them out.



White objects reflect most of the wavelengths of light that strike them. When all of these wavelengths are combined, we see white. On the other hand, when all of them are absorbed, and none reflected, we see black.



A green object such as a leaf reflects only those wavelengths that create the visual effect of green. Other colors in the light are absorbed by the leaf.

Color Balance

Although light from the sun or from a light bulb looks white to us, it not only contains a mixture of all colors, it contains these colors in varying proportions. Light from the midday sun, for example, is much bluer than light from a sunrise or a tungsten lamp. To produce what appears to us to be normal or accurate color balance, the image we capture must contain the colors in the original scene. These colors are affected by the color of the light source.

One way to describe the color of a light source is by its color temperature. The color temperature scale is calibrated in degrees Kelvin, somewhat like a thermometer that calibrates heat temperatures in degrees centigrade. The color temperature scale ranges from the lower color temperatures of reddish light to the higher color temperatures of bluish light. Daylight contains proportionately more light toward the blue end of the spectrum. Incandescent light contains more toward the red end. That’s why we describe daylight as "cooler" and incandescent light as "warmer."

Daylight

Incandescent

Fluorescent

"White" light actually contains light of different colors and in different proportions, The overall color cast of the light changes as the proportions

of the colors change. Although different white light sources have different "colors" you don’t see the subtle differences because your brain compensates automatically.

Image sensors can be balanced to match light of a particular color temperature. This is done using a system called white balance that automatically or manually adjusts the sensor’s relative sensitivity to different colors in order to match the overall color cast of the light it’s recording. The daylight (or outdoor) setting matches the cooler, more bluish color of daylight. The incandescent (or indoor) setting matches the warmer, more reddish color of studio lights.

You can preview color balance by looking at a scene in the LCD monitor. You can also check the color balance of any image you’ve already taken the same way. If you examine the images closely you may notice that white areas in particular have some color cast to them. If so, you may want to adjust white balance for subsequent shots. Many digital cameras offer a number of white balance settings, some for specific lighting situations.

- **Auto** (the default) works in a wide variety of lighting conditions.
- **Manual** lets you set white balance manually by aiming the camera at a piece of white paper.
- **Daylight or Sunny** is best when photographing outdoors in bright sunlight.
- **Incandescent or tungsten** is best when photographing indoors under incandescent lights.
- **Fluorescent** is best when photographing indoors under fluorescent lights.
- **Cloudy** is best when photographing outdoors in cloudy or overcast conditions.
- **Flash** is best when photographing with flash.

How To: Adjusting White Balance

Look in your camera manual for a section on **white balance** or **color balance**. There may be a way to set it manually for unusual lighting situations.

Color Balance and Time of Day

In photography, there is a color of light called "daylight." However, this type of light occurs only at a specific time of day. Over the course of the day, the light can change from a warm red at sunset, to a cold blue at noon, and then back to a warm red or orange at sunset. "Daylight" on the color temperature scale is really set for midday sun between 10 A.M. and 2 P.M. During these hours, colors appear clear, bright, and accurately rendered in the photo.

Before and after midday, light from the sun is modified by the extra distance it travels through the Earth's atmosphere. Some of the blue light is filtered out, leaving the light with a more reddish cast than at midday. This is easily seen very early or late in the day when the light is often quite red-orange in tone. The change in color will affect your pictures strongly, but this reddish cast is a wonderful light to photograph in.

Just before dawn and at dusk, colors often appear muted or monochromatic. During these hours when light is relatively dim, you often have to use an extra-long exposure time.

Midday light on a sunny day will produce colors that appear natural and accurately rendered.

Early morning and late afternoon light outdoors will produce a warmer, more reddish color balance than you will get at midday.

Sunsets and Sunrises

Sunsets and sunrises are relatively easy to expose because the exposure is not as critical as it is with some other scenes. If you underexpose the scene slightly, the colors will simply be a bit richer and darker. Slight overexposure will make the same scene slightly lighter.

The sun often takes on a flattened appearance as it rises above the horizon. When partially obscured and softened by a haze, its warm, red glow illuminates the foreground.

Sunrises and sunsets by themselves aren't very interesting. It's objects in the foreground, such as the skyline, or unusual atmospheric effects such as this dark cloud that give them some punch.

The colors in the sky are often richest in the half hour before the sun rises and the half hour after it sets. It pays to be patient as you watch the sky change during these periods. For one thing, the sun itself is below the horizon and not in the image so exposure problems are greatly reduced. Also, clouds in the sky often light up dramatically and in some cases, reflect the light to other clouds until you find yourself under a wonderful canopy of reflected color.

Every sunrise and sunset is unique and the variations can be truly amazing. It's certainly not true that "if you've seen one sunrise or sunset, you've seen them all." If you want the sun in the photo, it's best if it is softened and partly obscured by a mist or haze. If it rises as a hot white or yellow ball, find another subject, or turn around and photograph the scene it's illuminating.

With the bright disk of the sun included in a sunset or sunrise, your picture may come out somewhat underexposed and darker than you expected it to be. Add 1 or 2 stops of exposure to a sunset or sunrise that includes the disk of the sun.

Warning!

Never look at the bright sun through the viewfinder. You can seriously damage you eyes.

It’s tempting to take all of your photos of a rising or setting sun, but it often pays to turn around. The rich, warm light changes the colors of everything it hits. This is a magic time to capture images that will really stand out. Colors take on a warm, soft glow that can’t be found at any other time of the day.

Instead of shooting into the sun at sunrise or sunset, shoot with it behind you to capture rich, warm colors of scenes bathed in the sun's light.

A long-focal-length lens will enlarge the disk of the sun so that it becomes a more important part of the picture. Foreground objects silhouetted against the bright sky, can also add interest.

Here the camera was positioned so the rising sun was behind one of the grain elevators and wouldn't burn out the image with its glare.

Anticipating the Sun and Moon

When planning to integrate the sun or moon into an image it helps to know when it rises or sets. With the moon, it also helps to anticipate the phase. This information is available in almanacs, and also on the Web at the U.S. Naval Observatory (http://aa.usno.navy.mil/AA/data/). You can view the phase of the Moon at http://tycho.usno.navy.mil/vphase.html.

The Moon

The moon, especially when full, adds a lot to an image. The best time to capture the moon is when it's near the horizon. Because it is close to foreground objects at that time, it looks much larger than when it's higher in the sky.

Keep in mind that the moon is relatively dim and usually requires long exposures. Since it's moving relative to the Earth, longer exposures can actually blur it, giving it an oblong shape. To reduce the chances of this happening, shoot just before sunrise or just after sunset when there is still some light in the atmosphere from the recently set sun. (It bends around the Earth's curvature due to refraction in the atmosphere.)

The rising full moon, and the trail it leaves across the water, adds a lot to this photo of an old-fashioned coal-burning power plant on Salem Harbor.

Long exposures on bright moonlit nights can be very attractive. Just keep in mind that the moon does move so exposures longer than a minute or so may show it elongated.

Weather

There’s no need to leave your camera home just because the sun hasn’t come out. In fact, rain, snow, fog, and mist can add interest to your pictures. Objects at a distance often appear diffused and gray in such

weather, with foreground objects brighter than normal because they are seen against a muted background. Remember to take a little extra care in bad weather to protect your camera against excessive exposure to dampness.

Snow covered scenes are not only beautiful to look at, they make great photographs.

Even a light fog subdues colors and softens objects in the background.

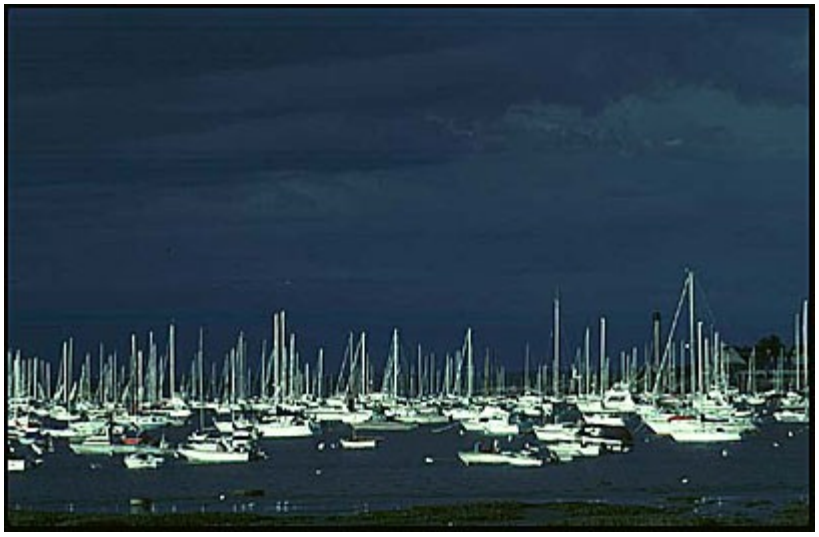
Rainbows always make good pictures. The problem is, you rarely find them where you want them, when you want them. To get better at capturing them, you should know something about how they form so you can anticipate them. Rainbows are formed by sunlight being refracted by raindrops. You'll usually find the combination of rain and sun at the leading or trailing edge of a summer storm. You can't see rainbows at all times of the day. To understand why, visualize the way the rainbow works. If you stand with your back to the sun while looking at a rainbow, imagine a line from the sun passing through your eye, through the Earth, and out into space. (This is called the antisolar point.) The rainbow forms a complete circle around this imaginary line, however from ground level part of it is always below the horizon. A line drawn from your eye to the top of the rainbow forms a 42-degree angle with the imaginary line from

the sun through your eye. (If there is a secondary rainbow, it forms an angle of 51-degrees.) Because these angles determine the position of the rainbow in the sky, it will sink as the sun rises and rise as the sun sinks. At some points, the entire rainbow, not just the bottom half, will be below the horizon where you can’t see it. That’s why you’ll never see a rainbow at midday.

From a plane you can sometimes see all 360-degrees of a rainbow. Here you see a section of one shot through an airliner window. To the right of the brighter primary rainbow is a dimmer secondary one.

A very light mist can dim the sun enough to include it in a photograph. If it weren't partially obscured by the fog, it would appear as a white dot against a very dark background.

On the coldest days of the year "sea smoke" forms over the ice-cold water. Here it surrounds a lobster boat and is backlit by the rising sun.



As a summer storm moves in, there are often times when the background is almost black with the sun shining on objects in the foreground. The contrasts can be very dramatic.

Storms are not a time to hide in the house, they are a time to get out and watch the light. As storms approach and recede, or when there are breaks in the clouds, you find some of the most interesting, at times almost surrealistic light. It's a time of muted contrasts but rich colors —a perfect environment for interesting photos.

Color Choices

The choices you make when photographing in color, such as how to position a colored object against its background or whether to concentrate on bright, brilliant colors or muted, soft ones, affect the mood and general impact of your pictures. Stop for a moment before you make an exposure and try to focus your attention only on the viewfinder image. Ask yourself how the colors relate to each other. Perhaps a change in camera position might bring one colored object to a better position in relation to another. Or perhaps you should wait until sunset turns the sky a more brilliant hue. Don't limit yourself to taking the first view of a scene that comes to your attention.

Contrasting colors can make a subject stand out, for example, the magenta bush stands out against the more muted green and brown background. This contrast draws the eye to the more brightly colored object in the image.

We expect certain familiar objects like human skin or green grass to be within an accepted range of normal colors. However, if the color is not known the viewer will accept a wide range of possible colors as normal.

Colors often create a psychological temperature. Blues and greens seem to be associated with coolness, water, or ice, while reds and oranges seem related to fire and warmth.

Photographing at Night

You can photograph many different things outdoors at night, so don't put your camera away just because the sun is gone for the day. Light sources

(street lights, automobile lights, neon signs, or fires) or brightly lit areas (illuminated buildings or areas under street lights) will dominate pictures at night because they stand out strongly against darker backgrounds. Plan to use these bright areas as the dominant part of your picture. A tripod will support your camera during long exposures and prevent blur caused by camera motion during the time the shutter is open.

This exterior of the Paris Opera House was shot at night with just illumination from spotlights.

To capture interesting images of fireworks, put people or water in the foreground. It also helps if there are identifiable objects in the image such as an illuminated building or monument to give the viewer a sense of place. Get upwind from the show since fireworks generate a lot of smoke that can become a problem if you are downwind. If you are upwind, the smoke will become part of the image, illuminated by the fireworks. Automatic exposure doesn’t work well with fireworks. Try a series of exposures of different bursts because there is a certain amount of luck involved. You might also use flash to illuminate foreground figures.

Fireworks can be dramatic, but are difficult to capture. You need to experiment and a digital camera is perfect for that because you can instantly review your results.

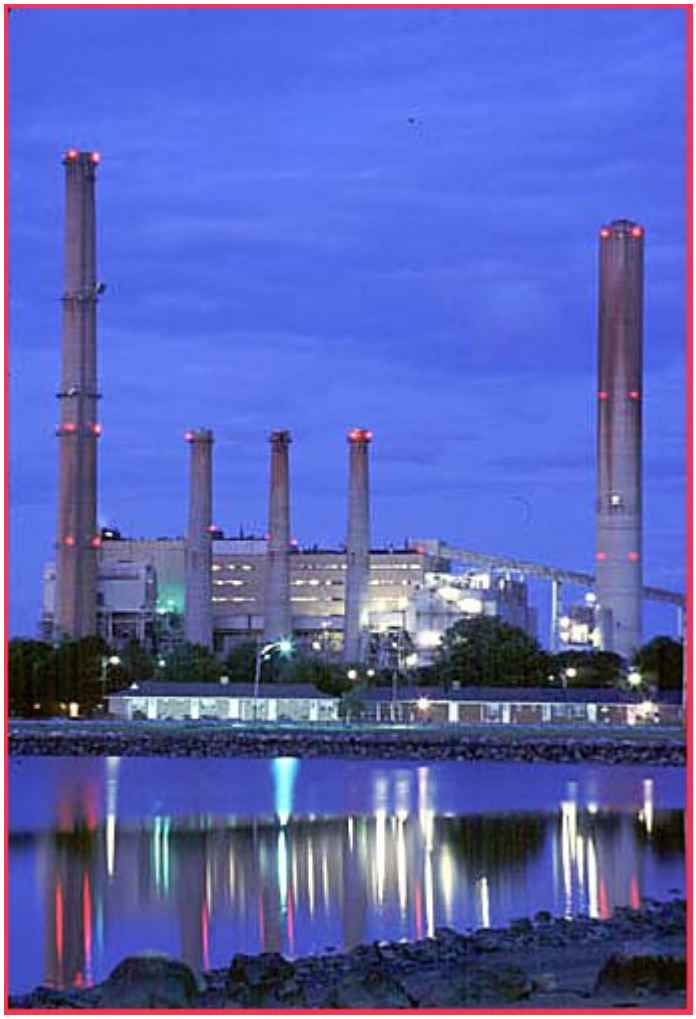
Set your exposure for fireworks by switching to aperture or shutter preferred mode and try for a setting of f/2.8 at 1/30 sec. You might also want to try increasing sensitivity, use exposure compensation, and try different combinations of aperture and shutter speed as well as those recommended here.

Candlelight provides a very warm glow to whatever it illuminates.

Use automatic exposure at night if brightly lit areas take up most of the scene visible in your viewfinder. If they do not, use exposure compensation to reduce the exposure and darken the image so bright lights aren't overexposed.

This picture of Chicago was taken just after sunset through an airliner window. A few minutes later the scene was too dark to capture without blurring due to long exposure times.

The U.S. Constitution lies floodlit in Marblehead Harbor.



There is a time at twilight and dawn where there is enough light in the sky so it has the same tonal value as the foreground.

Light: Its Direction

The direction that light is coming from relative to your camera's position is important because it affects the shadows that will be visible in your picture. Four main types of lighting are illustrated here: front-lighting, side-lighting, backlighting, and top-lighting. Notice the position of the shadows in these photographs and how they affect the subjects.

The direction of light can affect your automatic exposure. Backlighting, for example, can leave your subject silhouetted against a background so bright that your automatic exposure system will assume the subject is much brighter than it actually is, and so underexpose the scene and make the subject even darker. This is fine, if you want a silhouette. If you don't, you should use exposure compensation to lighten the image.

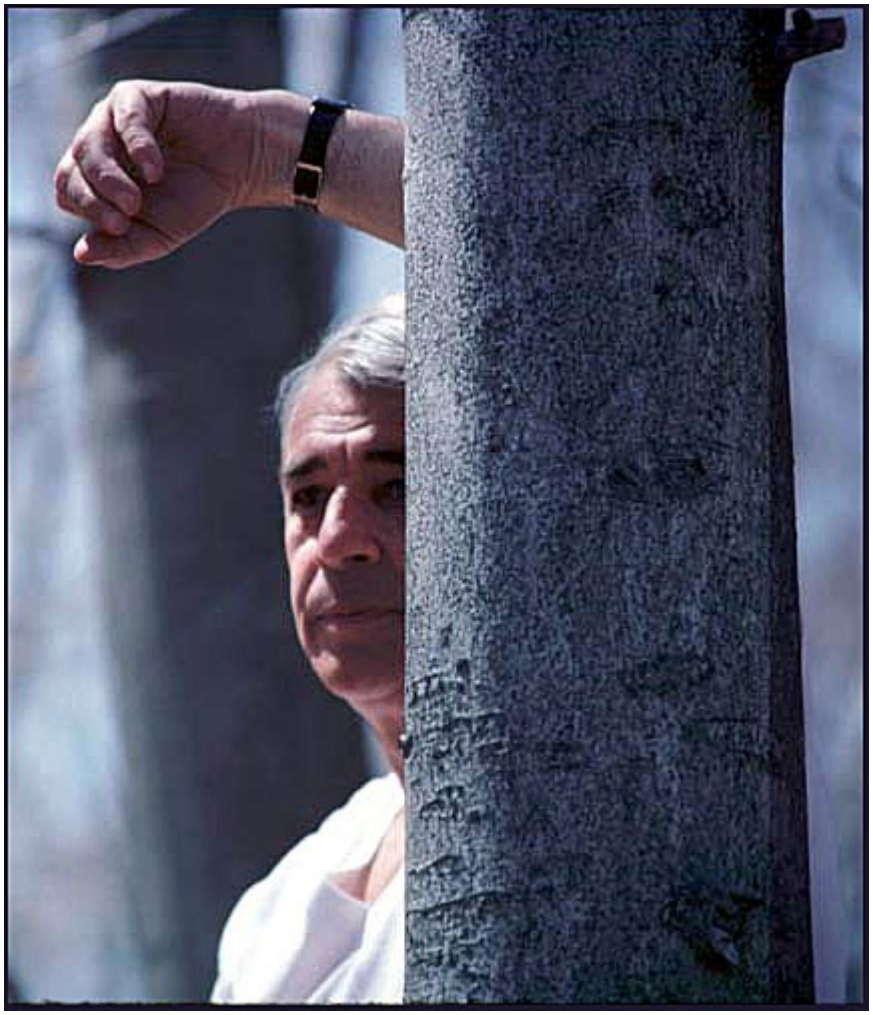
How To: Photographing Backlit Subjects

Look in your camera manual for sections on **fill flash** or **exposure compensation**.

Side-lighting, light that falls mainly on one side of the subject, increases the sense of texture and volume because such cross-lighting casts shadows visible from the camera's position that emphasize surface details. Landscape photographers often prefer to work early in the morning or late in the day because the sun low in the sky will sidelight scenes and add interesting surface textures.

Front-lighting, light that falls on the subject more or less from the camera's position, decreases visible shadows and so minimizes surface details such as skin texture. Front-lighting also tends to minimize the apparent roundness or volume of the subject.

Backlighting, light that comes from behind the subject, puts the side of the subject that is facing the camera in shade. Automatic exposure tends to make backlit scenes too dark. You can add exposure to lighten the picture, especially those parts that are in shade.



Top-lighting, light that comes from more or less overhead, can occur outdoors at noon or indoors in public buildings or other places where ceiling lights predominate. If you are photographing a person, you will notice that top-lighting tends to cast shadows in eye-sockets and illuminate the top of the nose brightly. To avoid this effect, you might try moving the person into the shade.

Top-lighting, such as that found at midday, can selectively illuminate things, such as this flag in the guy's back pocket, that would be in shadow with light coming from a lower angle.

Light: From Direct to Diffuse

Light not only has direction, it can be direct or diffused. Direct light, light coming mainly from one direction, produces relatively high contrast between bright highlights and dark shadows. Diffused light bounces onto the subject from several directions, lowering contrast. Contrast, in turn, affects the brilliance of colors, the amount of visible texture and detail, and other visual characteristics.

In direct light you may have to choose whether you want highlights or shadows to be correctly rendered because image sensors can accurately record only a limited range of contrast between light and dark areas. If this creates a problem because both highlights and shadowed areas are important, you can sometimes add fill light to lighten shadows and decrease contrast or adjust the contrast setting. In diffused light, colors tend to be softer than in direct light and textures are also softened because shadow edges are indistinct.

Direct light comes from a point source, such as the sun on a clear day. Direct light produces dark, hard-edged shadows that crisply outline details. Here the light and shadows almost form an abstraction.

Diffused light comes from a light source that is so large relative to the subject that it illuminates from several directions. On an hazy or overcast day, illumination comes from the entire dome of the sky, not from the brighter, but smaller, sun. Indoors, light bounced into an umbrella reflector or onto a wall or ceiling creates a broad source of light that wraps around the subject.

On a foggy or hazy day, objects in the foreground tend to stand out sharply against a background that is partially obscured by light reflecting from the atmosphere. You can emphasize this effect by increasing the exposure a stop or so more than recommended by your autoexposure system.

When the sky is overcast, yet still bright, interior rooms are flooded with a soft, even lighting.

Using Light and Color Creatively

Light is one of the elements of a scene that you can alter, play with, control, and make a less or more important part of your picture. Light can make a picture ominous or airy, glowing or velvety dark. To use light creatively, you may have to override your camera's autoexposure system.

An unusual color balance can be created with an image editing program or simply by taking advantage of the existing light on a scene. Try taking one picture in the usual way, then, before you move on, see if any other alteration of the image might be feasible.

Rays of light breaking through the clouds are more readily visible when positioned against a dark background, as in this scene of the sun pouring through a hole in the clouds.

When photographing sunrises or sunsets, the sun needn't be the center of interest. Here your eye is drawn to the man returning to the club from a sailing race and lifting his arms in a sign of victory.

One thing that's easy to forget is that we photograph light. In most cases, you can't create the light, you can just recognize it when it's there. It's the light that gives this image the mood it has. With most other light this scene wouldn't be anywhere near as dramatic.

With backlighting, and the subject against a dark background, you can get a "halo" effect with the hair.

Shooting into the sun before sunrise gives soft muted colors.

Sunlight filtering through an orange dome makes everything take on an orange hue.

The soft morning light on a misty day mutes the colors and gives a soft look to the image.

5. Understanding Lenses

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Perspective: How A Photograph Shows Depth

Many digital cameras come with zoom lenses so you can zoom in or out to meet different photographic opportunities. Zoom in on a subject and you can capture distant action at sporting events or in the field. Zoom out and you can capture a wide-angle view of a large group, a roomy interior, or of an expansive landscape. The ability to change your angle of view as you frame your image is one of your most powerful creative controls.

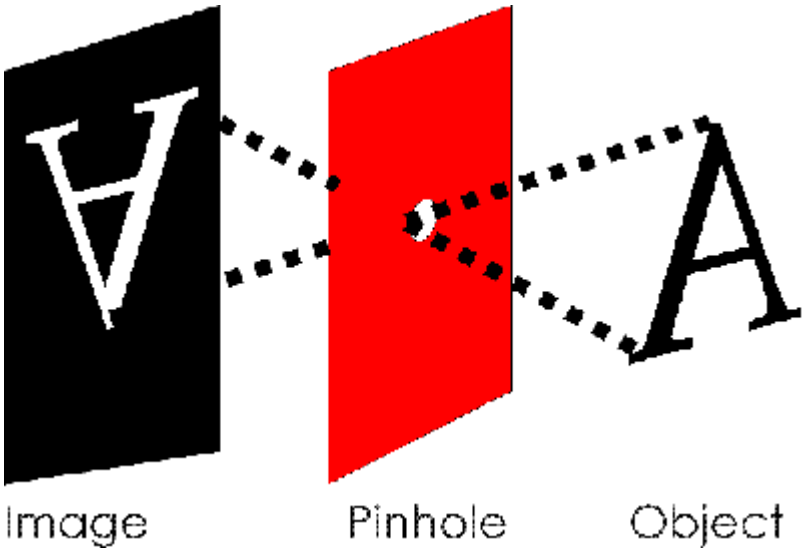
Modern camera lenses are designed on computers, ground to critical tolerances, coated with chemicals to improve light transmission, and then mounted in precision barrels and mounts. These lenses have excellent speed and sharpness, much more so than lenses of just a few years ago.

The primary function of a lens is to gather light reflecting from a scene and focus that light as sharply as possible onto the image sensor in the camera. A high-quality lens does this very well, but to get the most out of what it has to offer you should know a few of its characteristics and how they affect your images.

Although your camera is equipped only with a zoom lens, in this chapter we look at the effects it has when used as a normal, wide-angle, and telephoto lens. This approach gives you the background you need to use the lens effectively and creatively.

How a Lens Works

Surprisingly, lenses are not actually needed to take a picture. You can make a camera out of a shoebox with a small hole in one end. Known as a pinhole camera, this primitive device can actually focus an image and record it on film. To make a photograph, the box is loaded in the dark with a light-sensitive film or paper and the pinhole is covered with opaque tape. Peeling the tape back (much like a shutter) to uncover the pinhole (much like a lens aperture) begins the exposure, recovering the pinhole ends it. The exposed film or paper can be removed in a darkroom and the image developed.



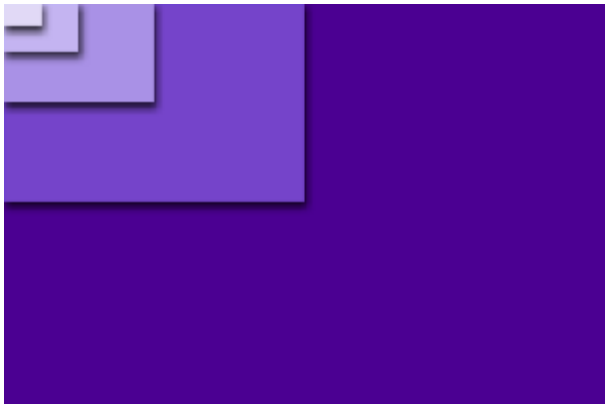
In a pinhole camera, the light waves from the object converge on the pinhole and focus the image upside down on the film.

Light is bent when it passes between substances having different densities. You can see this if you look at an object that is both in and out of water; for example a spoon in a glass half full of water looks bent at the point where it enters the water. Obviously, the spoon isn't bent; the light reflecting from the spoon is, as it passes from the dense water to the less dense air. The same effect occurs when light passes from the air through a piece of glass. If the glass is curved correctly, as it is in a camera lens, it can bend the light in such a way that an image of the scene in front of the lens is focused behind it.

Refraction bends light when it passes between substances of different densities.

The focal length of any lens is the distance between the optical center of the lens and the point at which it focuses an image. When you use a magnifying glass to focus the light from the sun onto a piece of paper, the area illuminated by the beam will become larger or smaller as you change the distance between the magnifying glass and paper. At the point where the bright circle of light is smallest (and where it might set the paper on fire), the simple lens that constitutes the magnifying glass is in focus. The distance between the magnifying glass and the paper is the lens' focal length.

Lens focal lengths are based on the physical characteristics of the lens so they are absolute values. However, a given focal length lens may be a wide angle lens on one camera and a telephoto lens on another. This is because descriptions such as "wide-angle" or "normal" depend on the size of the film or image sensor being used. As these get smaller, a given focal length lens magnifies more. There are currently a number of differently sized image sensors used in digital cameras. For that reason, different focal lengths are needed to give the same image coverage on different cameras. Because of the confusion this causes, most digital camera companies give the actual focal length of their lenses and then an equivalent focal length were the lenses to be adapted to a 35mm camera. For example, a camera may list its lens as 7.5mm (equivalent to 50mm on 35mm camera). Because digital equivalents vary widely, we often use the more familiar 35mm focal lengths in this book.



In the upper left corner are shown some image sensor sizes. The larger rectangle is the size of a frame of 35mm film.

Zoom Lenses

A zoom lens lets you choose any focal length within the range the lens is designed for. When you change focal lengths by zooming the lens, two important effects are immediately obvious in the lens' angle of view and its magnifying power.

Angle of view refers to how much of a scene the lens covers. Zoomed out, you have a wide-angle of view that captures a wide expanse of a scene. As you zoom in, the field of view narrows and you can isolate small portions of the scene without moving closer to the subject.

Magnification is related to the lens' angle of view. Since zooming out includes a wide sweep of the scene, all of the objects in the scene are reduced to fit into the image. Zooming in gives a much narrower angle of view, so objects in a scene appear larger.

Zoom lenses on digital cameras work much like those on camcorders. There are two buttons or a movable lever. Pressing one zooms in, increasing the focal length and narrowing the angle of view. Pressing the other zooms out, decreasing the focal length and widening the angle of view.

One of the best things about zoom lenses is the speed with which you can react to photo opportunities. Here, the key action in the scene on the left is lost in the large frame. By

zooming in, this key action was isolated (right).

How To: Zooming the Lens

To use a zoom lens you press a lever or zoom-out button to widen the angle of view and a lever or zoom-in button to enlarge subjects. The viewfinder zooms along with the optical zoom lens although it doesn't always show the entire picture area.

Normal Zoom

A "normal lens" for a 35mm camera usually refers to a lens with a 50mm focal length. On a digital camera, an equivalent lens will have a much smaller focal length because image sensors are much smaller than 35 mm film. When you zoom your lens and look at the image on the LCD monitor, the scene looks about the same as it does to the unaided eye. Looking at the LCD monitor with the lens zoomed all the way out makes everything appear closer than it actually is. With it zoomed out to a wide-angle, everything looks farther away.

A normal-focal-length (50mm) lens isn't necessarily the one photographers normally to use. Many photographers prefer the wider angle of view and greater depth of field provided by a slightly shorter focal length.

Changing Apertures

A lens' maximum aperture is determined by dividing the actual diameter of the aperture opening into the focal length of the lens. That's why the aperture might change from f/2.6 when zoomed out to f/4 when zoomed all the way in on a subject.

See for Yourself

A lens is called normal because it captures a scene just as the human eye does. This seems to violate common sense, because the eye's angle of view is much wider than any normal lens. However, you can demonstrate for yourself why a specific focal length is normal for your camera. If you are a passenger in a car, try zooming the lens as you watch the traffic ahead on the LCD monitor. The longer focal lengths make distant cars appear right on top of you; in reaction you might even try to put on your brakes and then discover the cars are nowhere near

as close as you thought. With shorter focal lengths, cars look far ahead, even when relatively close. A normal focal-length makes the cars appear in the same distance relationship as you perceive them ordinarily.

Another demonstration is to take two photographs of greatly different size and tape them to a wall. Look at them one at a time on the LCD monitor with the lens zoomed to a normal focal-length a little above it's widest angle of 28mm. Move close enough so each fills the LCD monitor. You'll discover you are at the correct distance for viewing the prints. With a longer focal-length you would feel too far away, and with a shorter one too close.

It's hard to look at a photo and tell what focal-length lens was used to take it. However, objects in an image taken with a normal lens look normal in their spatial relationships.

Wide-Angle Zoom

Zooming out gives you a wide-angle of view that lets you capture a wide expanse of a scene. This wide angle of view is ideal for use in tight spaces, such as when photographing landscapes and in small rooms where you can't position the camera a great distance from the subject.

If you don't get too close to your subjects, wide angle zoom is good for indoor portraits where including the setting is important.

A lens zoomed to a wide-angle also has great depth of field. This great depth of field makes short lenses good for street or action photographs. When out to capture quickly unfolding scenes, keep the lens zoomed out to a wide angle so you'll have maximum depth of field when you respond quickly to a photo opportunity.

Zooming out increases depth of field and widens the angle of coverage making it ideal for interior shots. The great depth of field also makes focusing less critical so you can capture those fleeting moments you might otherwise miss.

Short lenses also let you focus very close to your subject, and the effect this can have on the perspective in your images can be dramatic. Objects very close to the camera loom much larger than those farther in the background. This distortion in the apparent size of objects can deliberately give emphasis and when carried to an extreme, give an unrealistic appearance to a scene.

In addition to zooming your lens all of the way out for wide-angle coverage, some cameras have wide-angle lens adapters that widen it even more.

Shooting down on these two girls makes their heads look much larger than they really are since they are much closer to the camera and its wide-angle lens.

Telephoto Zoom

A lens zoomed in on a subject acts somewhat like a telescope: It magnifies the image of your subject. This is especially useful when you can’t get close to your subject—or don’t want to. Zooming in like this is ideal for wildlife, portrait, and candid photography, whenever getting close to a subject might disturb it.

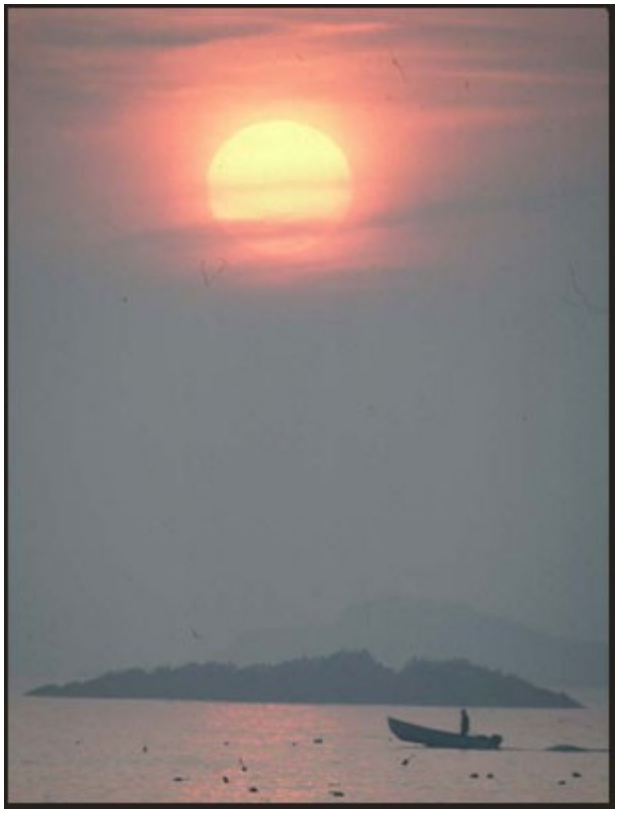
When you zoom in on a subject, depth of field gets shallower so you must focus carefully. Also, zooming in visually compresses space, making objects in the scene appear closer together than they actually are.

The primary drawback of zooming in is that it gives you a smaller maximum aperture. This smaller maximum aperture may require a longer shutter speed and since a long lens magnifies movement, just as it magnifies the subject, you may have to use a tripod instead of hand-holding the camera.

Zooming in makes distant objects appear compressed. Here a long lens has been used to "compress" a street scene at the foot of the Rocky Mountains in Colorado.

For a telephoto view, you can zoom the lens all the way in. For even more magnification, some cameras have optional lens converters that give you even longer focal lengths.

When the lineup of cement trucks (upper right) is shot head-on with a long lens (lower left) they appear much closer together then they really are. This is actually due to the distance from the subject, not the focal length of the lens, but the effect is easy to get with a long lens.



A long lens makes the sun look larger in relation to foreground objects.

Optical and Digital Zoom Lenses

Zoom lenses come in two varieties; optical and digital zooms. An **optical zoom** lens actually changes the amount of the scene falling on the image sensor. Every pixel in the image contains unique data so the final photo is sharp and clear. A **digital zoom** lens uses sleight of hand by taking a part of the normal image falling on the sensor and then enlarging it to fill the sensor. It does this by adding new pixels to the image using interpolation. The interpolated image doesn't have as many unique pixels as one taken with an optical zoom so is inferior. In fact, you don't even need this zoom feature because you can get exactly the same effect just by cropping a normal image in a photo-editing program and then enlarging it.

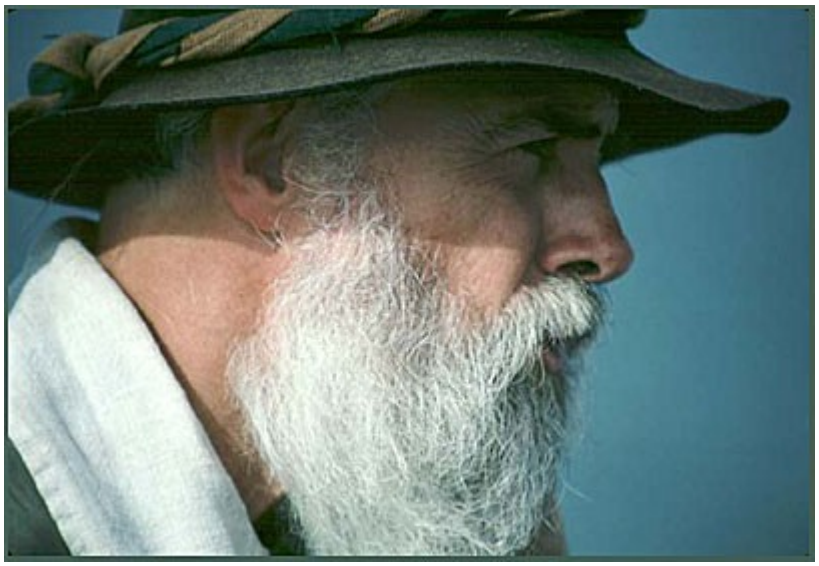
How To: Using Digital Tele

Look in your camera manual for a section on **digital tele** or **digital zoom**.

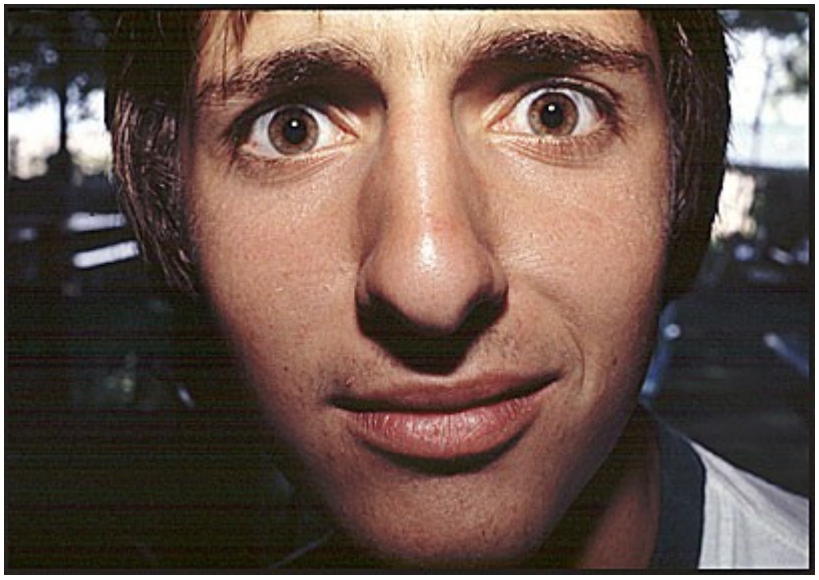
Portraits with a Zoom Lens

A zoom lens is an excellent portrait lens, especially for head-and-shoulders portraits. When zoomed in you can keep your distance and still fill the viewfinder frame with the subject. Keeping at a distance

eliminates the exaggerated perspective caused by working very close to a subject with a shorter focal length lens. It also helps relax your subjects if they get uneasy, as many people do, when a camera comes close.



A long lens lets you get portraits without crowding in on the subject. This let's you capture more natural expressions.



Using a lens zoomed out to a wide angle and close to the subject adds some distortion to the portrait but it still works as an image. Perhaps not as flattering as it might be, the image is probably more interesting to others than to the subject.

Perspective: How a Photograph Shows Depth

A photograph can appear to compress space so that objects appear closer together than you expect. Another photograph of the same scene can seem to expand space so that objects appear farther apart than normal. These apparent distortions in perspective—the appearance of depth in a photograph—are often attributed to the focal length of the lens being used but are actually caused by the distance of the lens from the subject.

The image on the left appears to be more "open" and spacious than the more visually "compressed" one on the right. However, the image on the right is actually contained in the image on the left. It just appears more compressed because the enlarged section includes only those elements farthest from the camera.

Changing camera-to-subject distance does change perspective as shown here. As the camera is moved closer to the foreground subject (bottom), the subject appears to increase in size relative to the background. This changing relationship between the size of objects in the foreground and background creates the difference in perspective.

6. Using Automatic Flash

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Automatic electronic flash is so convenient and easy to use that you are usually unaware it even fires. With your camera on automatic, it’s always ready when your autoexposure system decides it’s needed. But this on-camera flash lighting has certain characteristics that can make a difference in the way your pictures look. For example, the pictures will have a "flat" lighting typical of flash-on-camera shooting. Alternative approaches, such as positioning a separate flash off camera (or using a slave unit) may produce more interesting results. In any event, you will be able to use flash to better advantage as you become more familiar with its characteristics and the various forms available.

Many digital cameras have a variety of flash modes that we'll explore in this chapter. Although they go by different names, these modes typically include Auto that fires the flash whenever the light is too dim to take a photo, Anytime Flash that fires the flash regardless of how much available light there is, Red-eye Reduction that fires a separate lamp to reduce red-eye when taking portraits, Flash Cancel that turns the flash off so you can photograph with available light without the flash firing, and Slow Synchronized that keeps the shutter open longer than usual to lighten the background.

Types of Flash

Flash photography has come a long way since the 19th century when a photographer had to ignite a tray filled with gunpowder to illuminate a scene. Almost every digital camera comes with a small built-in automatic flash that is tied into the autoexposure system. These flash units are convenient, however their range is very short; normally around 10 feet or so. They are also so close to the lens, photos of people often capture them with red eyes. They emit a hard, direct light and can't be rotated to bounce flash off a wall or ceiling to soften it.

Flash on camera is convenient to use: every place you and your camera go, the flash goes with you. All flash-on-camera photos look very much the same—a flat, relatively shadowless light that minimizes surface textures and volumes.

To overcome these limitations, a variety of external flash units are made. These units work like those on 35mm SLRs. They either slip into a "hot shoe" on the digital camera that both holds them and connects them to the camera shutter release and autoexposure system, or they are mounted on brackets and connected to the camera by a synch cord, basically a small cable. This synch (pronounced "sink") cord makes the same electrical connection that the hot shoe does but lets you position the flash off camera.

A flash that rotates and swivels lets you bounce flash off walls and ceilings for softer light and more interesting effects.

Another way to use external flash is to buy a slave flash unit that fires automatically when it senses the burst of flash from the camera's built-in flash unit. Since many digital cameras fire the flash twice for each picture (the first is a pre-flash to set color balance), these units have to be adjustable so they fire when the camera's second flash goes off. These units are more powerful than the on-camera flash and also allow you to rotate the head to use bounce flash to soften shadows.

A slave flash unit. Courtesy of Digi-Slave.

How Automatic Flash Works

Every flash has a maximum useful range. How bright the light from a flash is when it reaches a subject depends on the flash's power and on how far the light has to travel. The further the subject is from the flash, the less light will reach it and so the less light will be reflected from the subject back toward the camera.

Flash light falls off (becomes dimmer) the farther it travels. Objects near the flash will be lighter in a picture than objects farther away. You can use this to advantage; for example, at night you can isolate a subject against a dark background.

When the flash fires, the beam of light expands as it moves father from the camera. As a result, subjects nearer the flash will be illuminated with a more intense light than subjects farther away. The rate at which the light falls off is described by the inverse square law. If the distance between the flash and subject is doubled, only one quarter the amount of light will reach the subject because the same amount of light is spread over a larger area. Conversely, when the distance is halved, four times as much light falls on a given area.

When subjects in an image are located at different distances from the camera, the exposure will only be correct for those at one distance—normally those closest to the camera or in the middle of the area metered by the autoexposure system. Subjects located farther from the flash will be increasingly darker the farther they are from the flash.

How To: Using Auto Flash

Auto mode is usually the default settings. Look in your camera manual for a section on **auto flash**.

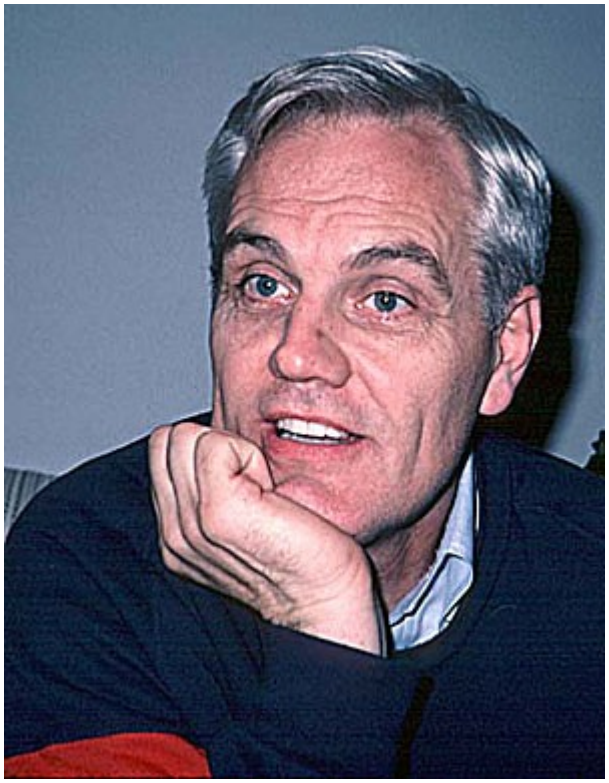
Portraits with Flash

Flash is a good source of light when you want to make portraits, particularly of children. The light from the flash is so fast that you never have to worry about your subject moving during the exposure and blurring the picture. For the same reason you don’t have to be quite as careful about camera motion blurring the image; you can hand-hold the camera and shoot as rapidly as the flash will recharge.

Positioning the flash and subjects

You may want to choose carefully the position of the flash. Light from a flash built-into the camera often produces less attractive results than if you bounce the light onto the subject off a wall, ceiling, or umbrella reflector.

When photographing more than one subject, each is given the same importance when lined up parallel to the camera because each receives the same amount of flash illumination. If they are at different distances from the flash, they will be illuminated differently. This is a good way to make one more visually dominant than others in the image.



When a subject is placed close to a wall, there will almost always be a distracting shadow in the image cast by the light from the flash. By moving the subject away from a wall, these shadows disappear.

Red-eye

When photographing people, you'll often see images with what's called "red eye." The light from a flash has entered through the subject's pupil and reflected off the back of the eye (the retina) and back out to the camera. Since the retina is full of thin blood vessels, it takes on a red color. To eliminate red-eye, many cameras have a "red-eye reduction" mode. This mode works by firing a short pre-flash lamp or a burst of flashes to close the subject's iris a moment before the actual flash fires to take the picture.

Here a champion figure skater displays the classic "red eyes."

To minimize red eye, you can also move an external flash farther away from the axis of the camera lens, tell the subject not to look directly at the camera, or increase the overall room lighting. You can also remove red-eye later using software included with the camera, but it's easier to avoid it to begin with.

How To: Combating red-eye

Look in your camera manual for a section on **red-eye** or **red-eye reduction**.

Using Fill Flash

When photographing people or other subjects in bright sun, shadow areas can be so dark in the image that they show little or no detail. If the shadow covers a large part of the subject, the effect can be distracting and unattractive. You can lighten such shadows by using flash to "fill" the

shadows to lighten them. In this mode the flash fires even when there is enough available light to take the picture.

With no fill flash (left) the bright background has underexposed the main subjects. Using fill flash (right), the people now stand out from the background.

Fill flash eliminates dark shadows in a backlit shot. Photo courtesy of Cathy Morin.

How To: Using Fill Flash

Look in your camera manual for a section on **fill**, **forced on**, or **any time** flash.

Using Slow Sync

Often, pictures taken with flash show a well exposed foreground subject against a black or dark background. The slow synchronized mode is designed to minimize this problem by leaving the shutter open longer than usual to lighten the background.

A slow shutter speed and flash combined to create this photo showing both sharpness and blur.

In many cases, the slow shutter speed used in this mode allows blur from rapidly moving objects or camera shake to appear as blur in the images. To avoid blur, use a tripod and photograph static subjects. Or, use this effect creatively. A short flash burst combined with a long shutter speed gives interesting effects. The flash freezes objects sharply, and then the dim ambient light blurs the image slightly and moving lights appear as streaks.

How To: Using Slow Sync

Look in your camera manual for a section on **slow synchronized flash**. When the flash is set to slow sync, long exposure times may create unwanted blur in the image. At times like this, you may want to use a camera support.

Using Available Light

There are times when the light is dim but you want to capture the unique colors of the available light. In these circumstances you need to turn the

flash off and support the camera for a long exposure. If you don't turn off the flash it will fire and the foreground subjects will appear as if photographed in daylight. If you don't support the camera you will likely have blur from camera movement.

Available light can add beautiful colors to a photograph.

When the flash is off, long exposure times may create blur in the image. At times like this, you may want to use a camera support.

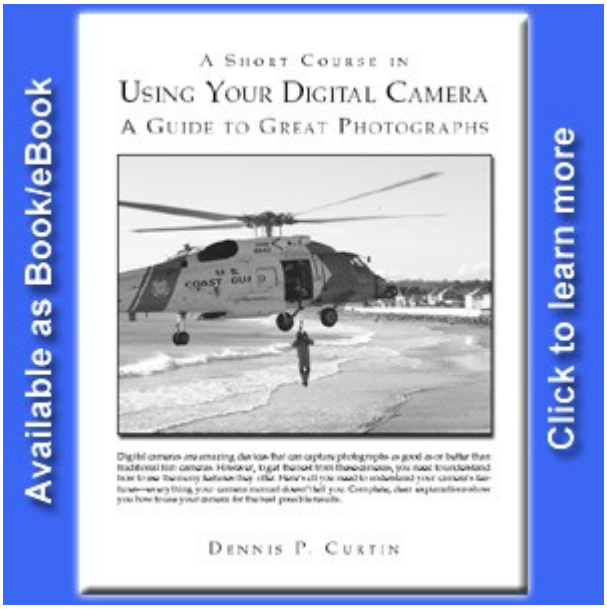
How To: Turning off the Flash

Look in your camera manual for a section on **forced off** or **off** flash.

When photographing in dim light there are things you can do to get better results when not using flash. Try the following as described in Chapter 2:

- Increase the camera's sensitivity.
- Use the camera's self-timer or remote control.
- Support the camera or use a tripod.

7. Exploring Close-up Photography



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Macro Lenses
Focusing and Depth of Field
Exposures and Backgrounds
Using Flash in Close-ups

One thing digital cameras are great for is photographing small objects—coins, jewelry, prints, maps, even insects—anything small enough to fit on a tabletop. You can put photos of your collectibles onto a Web page, sell them on an on-line auction, or make prints to file in a safe deposit box for insurance purposes.

In close-up or tabletop photography, digital cameras have a huge advantage over traditional film cameras because you can review your results and make adjustments as you shoot. If a photo doesn't turn out as you'd hoped, just delete it and try something new. A film photographer has to wait to get the film back from the lab before they can make adjustments. By then, they have probably taken apart the tabletop setup or forgotten what it was they did. Take advantage of your instant feedback to experiment and learn.

Macro photography lets you get dramatic shots, like this monarch butterfly emerging from its chrysalis.

The guidelines that follow are just that—guidelines. Feel free to experiment and break the rules. Never let the fact that you don't have something like a light source stop you. Innovate and experiment. That's how great photographs are taken.

Macro Lenses

When photographing small objects from coins to insects, your lens' minimum focusing distance determines how close you can get to the subject. The closer you can get to a subject, the larger it will be in the final image. A tiny coin surrounded by a large background isn't what you're trying to get. You're trying to get a large coin surrounded by a small background. For many pictures, just zooming your lens in on the subject will suffice. However, macro mode allows you to get a lot closer to the subject, making it much larger in the final image. If you can't get close enough to an object to fill the image area, you can always crop out the unwanted areas later. Just keep in mind that you don't have a lot of pixels to begin with and the more you crop, the smaller the image will become.

Keep in mind that when composing the image, you should use the LCD monitor, especially when closer than about 3 feet (90cm). If you don't, the object centered in the scene won't be centered in the photo.

A monarch butterfly larva forming a chrysalis.

Here a leaf hopper is caught by a macro lens.

This small, but very colorful caterpillar was captured with a macro lens.

How To: Taking Macro Close-ups

Look in your camera manual for a section on **macro** or **close-up** mode.

Focusing and Depth of Field

If you look at some close-up photographs, you will notice that very few of them appear to be completely sharp from foreground to background; in other words, the depth of field in a close-up tends to be shallow. The depth of field in an image depends on how small an aperture you use, how close you are to a subject, and how much the lens is zoomed. When you get the camera really close, don't expect much depth of field—maybe as little as a half-inch. It's best to arrange the objects so they all fall on the same plane. That way, if one's in focus, they all will be. Another thing to try with a zoom lens, is to use a wider angle of view. This will give you more depth of field if you don't also have to move the camera closer to the subject (doing so will offset the advantage of the wide-angle lens).

Also, when you focus, keep in mind that depth of field includes the plane you focus on plus an area in front of and behind that plane. You'll find that in close-ups half of the sharpest area will fall in front of the plane on which you focus and half behind it.

Shallow depth of field has its own benefits, so you don't necessarily have to think of it as a problem. An out-of-focus background can help isolate a small subject, making it stand out sharply.

In the left photo, a small aperture has given great depth of field. In the right photo, a large aperture has given a shallow depth of field. In both images, the camera was focused on the same building.

Tip: Use the LCD Monitor

When taking macro close-ups, especially at distances of less than 3 feet (90cm) use the LCD monitor to compose the image. If you don't, you won't be able to preview depth of field. Also, since the viewfinder is offset from the lens, the area seen in the viewfinder will differ from the area included in the image.

How To: Increasing depth of Field in Close-ups

- Increase the illumination of the subject to stop down the aperture.
- Don't get any closer to the subject than you have to.
- Focus on something in the middle of the scene (front to back) since in close-ups, depth of field is half in front and half behind the plane of critical focus.

- To increase depth of field, switch to aperture priority mode and select a small aperture such as f/11.

Exposures and Backgrounds

The exposure procedure for close-up and tabletop photography isn't a lot different from normal photography but you have the opportunity to control lighting. The biggest difficulty may arise from automatic exposure. Many close-up photographs are of small objects that don't entirely fill the viewfinder frame. Automatic exposure systems can be fooled if the brightness of the small object is different from the brightness of the larger background. The meter averages all of the light reflecting

from the scene and may select an exposure that makes the main subject too light or too dark. In these cases, use exposure compensation to adjust for the background. If an image is too dark, increase the exposure. If the image is too light, decrease the exposure.

Some thought should be given to the background you use. It should be one that makes your subject jump out, and not overwhelm it. The safest background to use is a sheet of neutral gray poster board that can be formed into a curved "L" shape to give a nice smooth gradation of light behind the image. It's safe, because it reduces potential exposure problems and most things show well against it. Other options include black or white backgrounds but they may cause some exposure problems unless you use exposure compensation. Finally there are colored backgrounds, but these should be selected to support and not clash with the colors in the subject.

The texture of the background is also a consideration. For example, black velvet has no reflections at all while black posterboard might show them. Here, a dark background sets off the small white sculpture.

Arranging Lighting

The lighting on small objects is just as important as it is for normal subjects. Objects need to be illuminated properly to bring out details and colors well. You can light a subject in several ways, depending on your objectives. A flat object needs to be illuminated evenly; an object with low relief, such as a coin needs to be cross-lit to bring out details; some objects might look better with the diffuse lighting provided by a light tent (see below). Electronic flash can freeze action and increase depth of field. Your options are varied, limited only by your willingness to experiment.

Flat copy such as posters, stamps, prints, or pages from books require soft, even light over their surface and the camera's image sensor must be exactly parallel to it to prevent "keystoning." Even then, most lenses will curve otherwise straight lines at the periphery of the image because they are not designed for copying and are not perfectly rectilinear. (This is called curvilinear distortion.) There are other lens aberrations that make

it difficult to keep the entire image in focus at the same time. This is one reason to use a small aperture that increases depth of field and uses the center portion of the lens where aberrations are least likely to affect the image.

When photographing flat copy, you need even lighting.

Keep in mind that the color of the light you use to illuminate an object may affect the colors in the final image. Tungsten bulbs will give it an orange cast and fluorescent lights will give it a green cast. You'll have to experiment with this aspect using manual white balance settings. In other cases, you may find that you like the artificial colors or you may be able to adjust them in your image editing program.

Using a reflector to lighten shadows

When the light illuminating a small subject casts hard, dark shadows, you can lighten the shadows by arranging reflectors around the subject to bounce part of the light back onto the shadowed area. You can use almost any relatively large, flat reflective object, including cardboard, cloth, or aluminum foil (crumpling the foil to wrinkle it, then opening it out again works best). Position the reflector so that it points toward the shadowed side of the subject. As you adjust the angle of the reflector, you will be able to observe its effects on the shadows. Use a white or neutral-toned reflector so the color of the reflector doesn't add a color cast to the image.

Using a light tent

One way to bathe a subject in soft, even lighting—particularly useful for highly reflective subjects such as jewelry—is by using a simple light tent. The object is surrounded by a translucent material which is lit from the outside. If the subject is small enough, you can use a plastic gallon milk bottle with the bottom cut out and the top enlarged for the camera lens. When positioned over the subject and illuminated by a pair of floodlights, the light inside the bottle is diffused by the translucent sides of the bottle. The result is a very even lighting of the subject.

Larger subjects require larger light tents. You can construct a wooden frame and cover it with cloth or plastic sheets. When illuminated from outside by two or more floodlights, the light within the tent will be diffuse and nondirectional.

Using Flash in Close-ups

There are two important reasons to use flash in tabletop photography. With flash, you can use smaller apertures for greater depth of field, and extremely short bursts of light at close distances prevent camera or subject movement from causing blur. Using electronic flash with predictable results takes a little effort and you may need to practice and experiment.

External flash

Direct on-camera flash doesn’t give a picture the feeling of texture and depth that you can get from side-lighting. If you use an external flash, you can position the flash to illuminate the subject from an angle for a better lighting effect. External flash units can be connected to the camera’s connector for external flash or can be a slave unit that fires when it senses the on-camera flash firing.

Flash was used to freeze this small green stinkbug.

Flash in Close-ups

When using flash for macro close-up images the flash may not fully illuminate the subject because of it's position. Be sure to take a test shot.

Ring flash units

A special kind of flash, also available as slave units, is the ring flash. These units fit around the lens and fire a circle of light on the subject. They are ideal for shadowless close-up photography such as that used in medical, dental, and nature photography. Because ring flash is so flat (shadowless), some units allow you to fire just one side or the other so the flash casts shadows that show surface modeling in the subject.

A ring flash used for close- up photography. Courtesy of Digi-Slave.

8. Special Features

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Panoramic Images
Photographing in Black & White
Continuous or Multi-shot Photography
Movies

Digital cameras offer a number of special features that offer exciting creative possibilities. These include support for panoramas, black & white pictures, and the ability to shoot a series of pictures instead of just one. None of these features is difficult to use so you should give them a try.

Panoramic Images

Although panoramic photographs have been taken in sections and pasted together for years, it was the development of computer software that made seamless panoramas possible with a regular camera.

To create a seamless panorama with a digital camera, you begin by capturing a series of images around a single point of rotation, the optical center of the lens. Later, you stitch these views together with software.

Here are three images taken in sequence.

Here the three images have been stitched together into a single panorama.

Basic Techniques

There are a few important ingredients in getting good panoramic images.

- Zooming the lens to a wide angle requires fewer pictures to cover the same view but make things appear smaller and more distant.
- When photographing a horizontal or vertical sequence, stand in the same position and rotate the camera.
- When photographing documents, center the camera over each section and keep it at the same height for each shot.
- Holding the camera vertically for horizontal panoramas gives you more height in the images but requires more images to cover the same horizontal area.
- The camera should be as level as possible as you take the pictures. In a 360-degree pan, the first and last images must "connect" and overlap.
- The images should overlap by 30-50% horizontally and not be out of vertical alignment by much more than 10%.
- Avoid placing subjects that move in overlapping areas and don’t combine nearby objects in the same scene as distant ones or they will be distorted.
- Place a distinctive subject in each overlapping area to make it easy for the software to know how to combine the images.

Exposure and color balance

The software you use to stitch images together can even out the lighting in a scene but it helps if you give it good images to work with. When taking panoramas some cameras let you use autoexposure lock to ensure that exposure and white balance are consistent throughout the series of images. The settings are locked in at those used for the first image in the series after turning on panoramic mode.

Here's a panorama stitched together from a series of handheld images. I waited until the prayer so everyone was motionless.

Try to avoid extremes in lighting. These occur on bright sunny days when there are bright highlights and dark shadows. The problem is compounded because you may have to shoot some of the pictures into the sun. If you can pick your time, pick a day when it's cloudy bright—overcast but with slight shadows on the ground. If the sun is out, shoot at midday to keep the lighting even. If you have to shoot at other times, position the camera so direct sunlight is blocked behind a tree or building when photographing in its direction. When shooting indoor panoramas, set up the camera to avoid shots of windows with direct sun shining through.

How To: Taking Panoramas

Look in your camera manual for a section on **panoramas** or **exposure lock**.

Photographing in Black and White

For years, photographers in the fine arts, such as Ansel Adams, have taken black and white pictures almost exclusively. If you want to work in the same medium, some cameras let you shoot in black and white as well as color. This mode is also useful if the photograph is going to be printed in black and white. One advantage of this mode is that black and white images don’t have to be compressed as much as color pictures so their image quality is actually higher.

One of the masters of black & white photography was Ansel Adams, shown here discussing his books with Tim Hill of New York Graphic Society when we were in Carmel working on his new books.

Black and white images have a quality all their own.

How To: Shooting in Black & White

Look in your camera guide for a section on **black and white** or **gray scale** photography. When taking pictures in black and white, they are displayed on the LCD monitor in that format. This makes it much easier to visualize the end result.

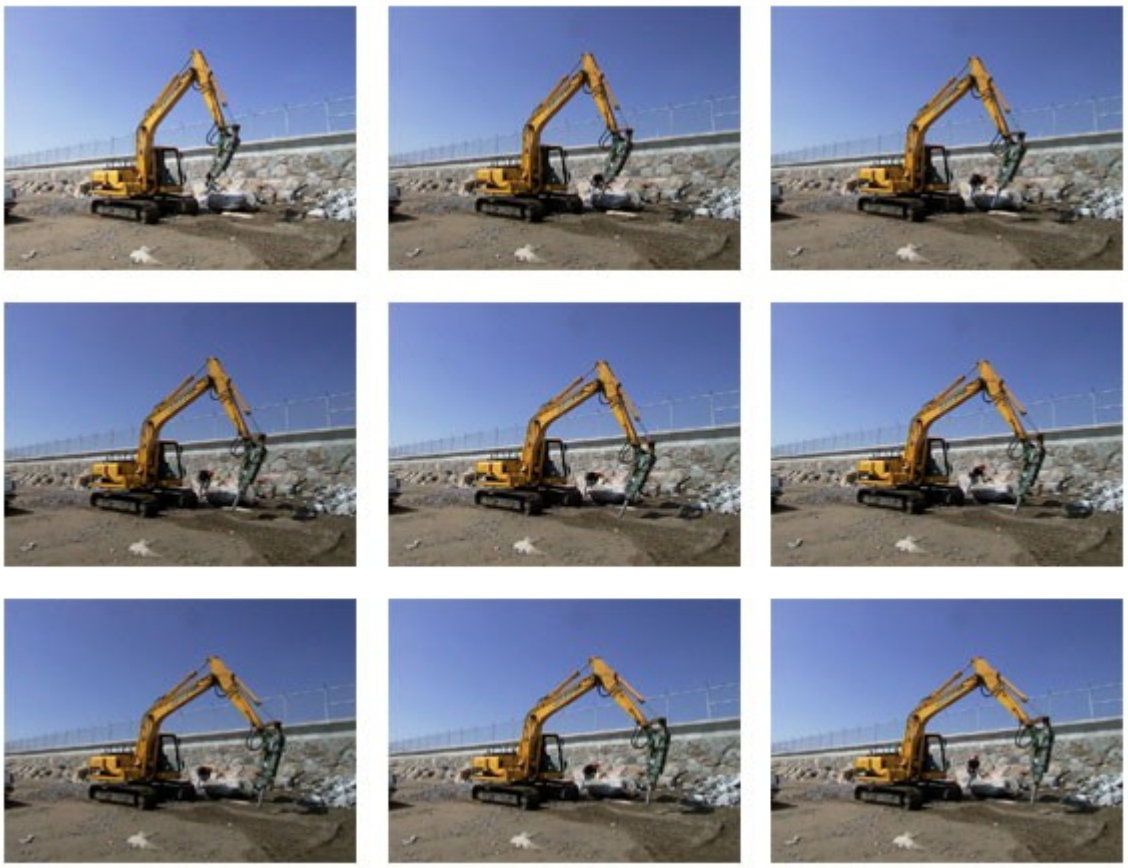
Continuous or Multi-shot Photography

With digital cameras, you normally take one photo at a time, but you're not limited to that way of shooting. You can also capture sequences of photos. In this continuous mode, you just hold down the shutter-release

button and images are captured one after another. You can then choose the best image from the sequence or use all of them to create animations on your computer.

In most cases, the camera uses a smaller image size, such as 640 x 480 or smaller, to take sequences. This reduces the processing needed so you can take images at a faster rate.

When shooting in continuous mode, you'll take pictures more quickly if the light is brighter. You may get your best results in bright sunlight.



This sequence was taken in continuous mode on a bright sunny day. If you look closely, you'll see that the excavator's boom is moving out during the sequence.

There are programs that convert a series of images into an animated GIF. When posted on the Web, the images are quickly displayed one after the other like frames in a movie. One shareware program you can use is GIF Construction Set.

This is a huge animated GIF put together with GIF Construct ion Set. If it doesn't play, click your browser's reload button.

How To: Using Multi-shot Photography

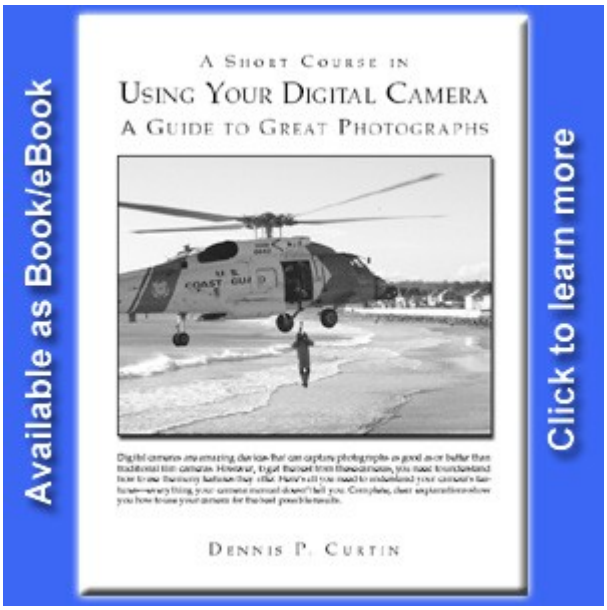
Look in your camera guide for a section on **continuous**, **sequential**, or **multi-shot** photography.

Movies

A number of digital cameras can capture short movies that you can then play back on the camera's monitor or TV screen, post on a Web page, or attach to an e-mail. The cameras vary in their ability to capture video clips in a number of respects:

- Not all can capture sound along with the video.
- The length of movies is either set to a specific time or the capacity of the storage device being used.
- The frame rate may vary between 15 and 30 or so frames per second.
- The size of the frames may be dramatically reduced, perhaps as small as 160 x 120 or 320 x 240.
- Movies are saved in a variety of formats including avi, jpeg, and QuickTime movie format (.mov).

9. Seeing Creative Images



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Play with the Horizon Line
Look for Unusual Atmospherics
Explore Reflections
Play with Shadows
Play with Patterns
Look for the Unusual
Shoot from Unexpected Places or Angles
And Yes, Even Sex

Pictures don’t always have to be sharp to be good, perfect exposures don’t always give the best results, camera angles don’t always have to be the same. Digital photography is so inexpensive you shouldn’t feel the need to get every shot perfect. It’s likely your photographs won’t be interesting if you don’t take chances and explore new approaches. When you find a situation that catches you eye, shoot it from a variety of positions, if you have a zoom lens use it, try using exposure compensation. Keep experimenting and trying new techniques, occasionally do things "wrong" deliberately. Those results that appear interesting can be applied in other situations. Eventually you’ll find a distinctive personal style that allows you to convey the world to others from your own unique viewpoint.

One mistake many photographers make is to think they have to go to unique places to get unique photographs. This leads you to ignore the possibilities nearby and at-hand. Because we admire the work that Edward Weston did at Point Lobos, or that Ansel Adams did at Yosemite, we often think we have to go to Point Lobos or Yosemite. What's often forgotten is that these people were shooting in their own back yards. They knew the area and its light intimately. They took photographs of the same places over and over again from different vantage points and under different lighting to build their skills. And compared to André Kertész in his later years, their backyards were huge. Kertész did some wonderful work when he was too old to go out by shooting out of his New York apartment building. His photos of the street below and the park across from his building show what can be done from a fixed point with a creative imagination. To build your skills, photograph the same things over and over again as the light changes. Try different points of view, and different angles and compositions. You have no excuse to not do this

because unlike these earlier photographers, you're not spending money on film when you try new things.

Play with the Horizon Line

When photographing out of doors, one of the key elements in many images is the horizon line and where you place it in the image. Some photographers like to follow "rules" and place the horizon line so it's one-third up from the bottom of the image. This rule may give interesting images but you'll do better trying different things. Despite what some people believe, their are no rules in photography. If there were, photography would be a lot easier than it really is.

The low horizon line emphasizes the vast spaces and the low ceiling for the mist.

The higher horizon line emphasizes the foreground.

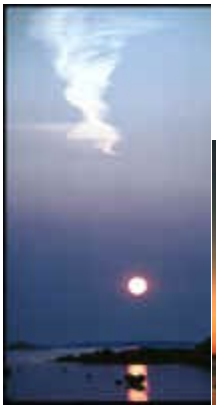
Setting the horizon line in the middle of the image gives equal emphasis to the sky and the water.

Setting the turkey at the base of the frame changes the image a lot from what it would be if he'd been centered.

Setting the horizon line at the bottom edge of the image makes the sky the dominant part of the image and conveys a feeling of vastness.

Look for Unusual Atmospherics

In the rising or fading light at dawn and dusk you can often see unusual lighting in the sky. One approach to photographing these scenes is to place something interesting in the foreground. Also, bracket your exposure so you have a variety of images to choose from.



The moon reflects in the water while a soon to rise sun illuminates and overhead cloud.

The light from a soon to rise sun creates a fan shape above the horizon.

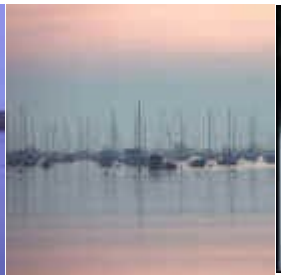
Known as a "pillar" this vertical shaft of light above the setting sun are caused by ice crystals in the air.

Here, the last of the lifting morning fog makes the image by providing that extra element that creates a mood.

Explore Reflections

Reflections can add a lot of interest to a photo and they are everywhere. Day and night, they are on the water, in windows, and on any shiny reflective surface.

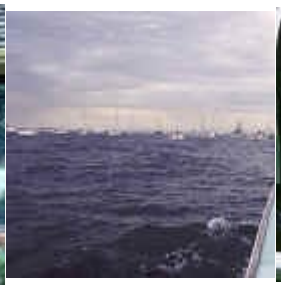
A lighthouse light is reflected in the smooth harbor water on a quiet windless morning.



Taken from almost the same spot as the photo to the left, here the sky is pink but the light again reflects from the lighthouse.

A small bird is reflected in the quiet water.

A tree reflects from a mirrored California window.



Shooting down the side of a New England fishing boat captures the ocean's reflections in the boat's windows.

The grill in an old car at a car show reflects the crowd.

With the light illuminating a nearby building, a store windows becomes alive with interest.

A flag reflects in the window of an old New England house.

The rising sun reflects off a seaside windows throwing a bright reflection on the harbor water.

Play with Shadows

Bright sunny days may look beautiful, but they arent' the best days for photography. The hard, direct light casts black shadows everywhere. But shadows are interesting, you just have to think about them and where they fall. Too often we just notice the bright part of the subject when composing pictures.

There's not a lot to see on the surface at the Arizona Titan Missile Museum. In desperation, I used the shadows of a crowd of visitors to get a more dramatic image.

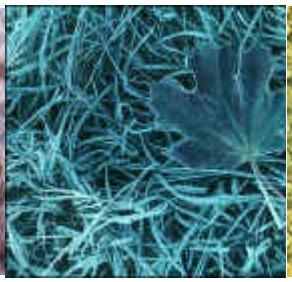
Here a small cloud casts a shadow over just the U.S. Constitution while everything else remains in bright sunlight. It gives the old warship a more threatening look.

By shooting down and not including the people's heads, the shadows play a more important role in the image.

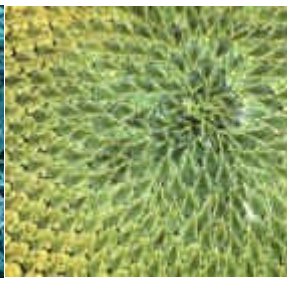
Play with Patterns

Patterns are everywhere, you just have to practice noticing them. Some have a center of interest, many just an unbroken rhythm that makes them interesting.

Salt meadow grass found in salt mashes forms long waves.



A maple leaf lies on the grass on the day of the first frost.



The seeds in a sunflower form radiating patterns.

The morning sun forms shadows on the melting ice of a Rocky Mountain lake.

The paint peels from an old sign.

A flower blossom is a rich source of both color and patterns.

Fallen maple leaves.

The field of mustard, the row of houses, and the row of trees all form a very regular pattern in the image.

This straight line of gulls added to the photo's interest.

A newly mown lawn in front of a castle in England. Click the picture to enlarge it and you'll see the lawn is set up for croquette.

Ripples in the sand when the tide goes out look like miniature sand dunes.

Look for the Unusual

I'm one of those photographers who love kitsch but it's getting harder and harder to find. However, if you keep your eyes open for humorous or interesting images. you'll be surprised at what you might find. You just have to be ready to capture them when you see them..



A father peers through the transparent side of an inflatable whale while the kids pose for a photo.


Not a great image, but the idea behind it is interesting. The town of Gas, Kansas has painted their water tower to look something like a gas can and labeled it such.

A truck parked alongside a rural California road added a lot to the surrounding landscape.

Two guys attending an art lecture found no place else to sit in the standing-room only crowd.

A horse skeleton outside of a rock shop. I wonder if it attracts people with money to spend?

Shoot from Unexpected Places or Angles

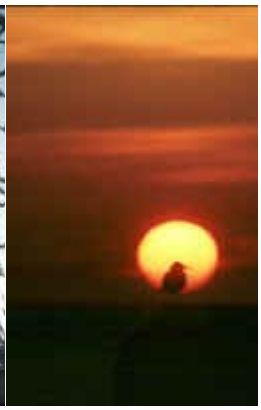
Most people shoot straight ahead from a standing position. That's why so may photograph look alike. Try shooting up, shooting down, getting on your knees, climbing tall buildings. Do anything you can to change the angle of view. Shoot through glass or screens, experiment with every possible aspect.

Small boats form a path for the tall ships visiting Boston. I happened to be flying over in an airliner and shot through the window.

Shooting up causes vertical lines to converge in the distance.

A small town baseball diamond shot through the grandstand screen.

The crooked branches give an eerie feeling to the Eiffel Tower.



By just moving to the side a little I was able to line up the gull with the rising sun.

Shooting these campers through the mesh "window" on their tent created a very soft image.

Girl scouts take a break after a hot Memorial Day parade through town.

Be sure you don't let glass between you and an interesting subject stop you from shooting. You don't have to open a window, just shoot right through the glass.

Using flash, this shark swimming past an aquarium window is frozen in place.

These colorful anemones were photographed through the glass at an aquarium.

Shooting through the back window of one of the cog railroad cars on Mt. Washington gave an interesting image of the engine and another car.

And Yes, Even Sex

Probably not what you were expecting, but sex nonetheless. To capture these kinds of scenes you have to carry your camera with you a lot or really be in tune with the natural cycle so you can anticipate when things are happening.

Here, beetles (left), ladybugs (center), and horseshoe crabs (right) do their thing.